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Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development: Supporting Selected Asian BRI Partner Countries to Achieve 2030 Sustainable Development Agenda

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Towards An Integrated Green Transformation Strategy: Report for Türkiye

Abstract

This Report provides a synthesis review of the background papers to the UNCTAD project entitled “Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development: Supporting Selected Asian BRI Partner Countries to Achieve 2030 Sustainable Development Agenda”, with an exclusive focus on Türkiye. It aims to elucidate the principal challenges and structural limitations, alongside potential strategies for decarbonization and green transformation in Türkiye. While contending that the prevailing global financial system significantly impedes Türkiye's pursuit of a sustainable and environmentally friendly industrial policy, it provides key messages to expand the arsenal of viable opportunities towards targeting Türkiye’s net zero emissions by 2053.

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Introduction

As the signals of an ecological and climate crisis are escalating, calls intensify towards green transition to achieve a net zero emissions global economy by mid-century. Researchers at the *International Panel on Climate Change* (IPCC) share their assessments that meeting the 1.5°C target is possible, and yet it will require "*deep emissions reductions*" and "*rapid, far-reaching and unprecedented changes in all aspects of society*". The *International Energy Agency* calls to double the pace of energy efficiency progress towards green transition, and notes that "*large scale financing mechanisms ought to be enacted*".

While climate change is undeniably a global issue, its impacts are not evenly distributed across the world economy. The global initiatives to address climate change are greatly hindered by the longstanding disparities between developed and developing nations in terms of the ecological, economic, and political challenges they face. Accordingly, UNCTAD's *Trade and Development Report 2019*, rightly argues that "*the global economy does not serve all people equally. Under the current configuration of policies, the rules, market dynamics and corporate power, economic gaps are likely to widen and environmental degradation will intensify*" (TDR 2019: 41)

This Report is a companion to the UNCTAD project, "*Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development: Supporting Selected Asian BRI Partner Countries to Achieve 2030 Sustainable Development Agenda.*" The overall project aims to assist four major developing countries in Asia in their efforts to achieve the Sustainable Development Goals (SDGs) and green industrialization - Kazakhstan, Malaysia, Pakistan, and Türkiye - to achieve the 2030 Agenda through: (1) Identifying effective integrated policy strategies for green industrialization; (2) Improving the capacity of policymakers at the national level, including through South-South peer-learning; and (3) Strengthening economic cooperation and policy coordination at the regional level.

Given the analytical and policy contributions of the background papers, the main objective of this report is to summarize, identify and promote integrated policy strategies to facilitate Türkiye's viable green transformations while enabling a climate-resilient, socially inclusive and sustainable economic development pathway.

To this end, the next section starts with a thorough overview of Türkiye's environmental policy interventions and reports on the current trends of climate change episodes together with relevant macroeconomic and environmental indicators, and continues in Section 2 with an analytical overview of the current and planned strategies towards green transformation. The specifics of sectorial strategies and micro developments are discussed in section 3. Section 4 is reserved for overall summary conclusions and policy recommendations as distilled from the background papers of the project.

1. History of Environmental Policies in Türkiye and Current Trends

Türkiye recently ratified the Paris Agreement and announced her intention to achieve *net zero* status in aggregate emissions by 2053. Against this background, however, it is a fair assessment that Türkiye's official stance is still geared towards a fossil fuels-led power generation pathway wherein coal-based power stations continue to carry a high burden with roughly one-fifth of electricity production. In fact, one of the main criticisms of Türkiye's climate abatement pathway is that its planned "peak" in *absolute* greenhouse gaseous emissions has been postponed till very late –to 2038; and that its *Nationally Determined Contributions* (NDC) projections are only focused on reducing these emissions relative to a hypothetical *business-as-usual* scenario, which is heavily criticized for its exaggerated and questionable assumptions. [1] This indicates that Türkiye will likely deviate from the trajectory of other developing emerging market countries, as well as the world averages, in the coming decades. Yet, Türkiye has very strong potential in renewables-led power generation given her geographical opportunities and wide array of potential gains in technological efficiency in energy production.

Environmental policy instruments in Türkiye have primarily focused on implementing excise taxes on energy usage, with little emphasis on earmarking those funds specifically towards environmental abatement. Nevertheless, it has been extensively documented that relying solely on unfettered price mechanisms implemented through the market will likely be insufficient to effectively control global greenhouse gas (GHG) concentrations and to ensure a sustainable and environmentally friendly trajectory of growth (Acar, Challe, Christopoulos, & Christo, 2018). One reason for the problem is that market optimizers have not kept pace with the advancements in new environmentally friendly technology, which often result in beneficial impacts such as increased clustering, the spread of information, external benefits for multiple companies, and industry-wide learning. Furthermore, the decentralized optimization inherent in the laissez-faire behaviors of the markets may not be capable of capturing these beneficial spillover effects. The core of these issues lies in market failures, which can be addressed more effectively by the fundamental economic and regulatory tools. However, in Türkiye and elsewhere, there has been a lack of consistent implementation of these tools as part of comprehensive policy measures.

Currently, Türkiye is trying to follow an indigenous industrialization strategy that is founded on the acquisition of renewable energy sources. This, however, is not a task that can be designated as easily. To begin, the economy is severely hindered by the binding import dependence on essential intermediate inputs and foreign technology, which is a significant constraint in maintaining its energy security. Additionally, the nation's energy security is severely constrained by availability of domestic resources and the foreign exchange gap limiting opportunities to import. Furthermore, the limitations of a financial speculation-driven growth pattern (e.g Grabel, 1995) restrict the economy's capacity to generate indigenous sources of development, holding the economy's limited savings hostage to unproductive rent-seeking activities of excessively speculative finance.[2]

1 See, *e.g.*, Voyvoda & Yeldan, 2016; Şahin. 2016; Acar & Yeldan, 2018.

2 See Orhangazi & Yeldan, 2023a; and Yeldan 2022 for more discussion on the role of speculation-led growth patterns for Türkiye. See Grabel, 1995 and Taylor, 2004 for the original conceptualization of the patterns of speculation-led growth.

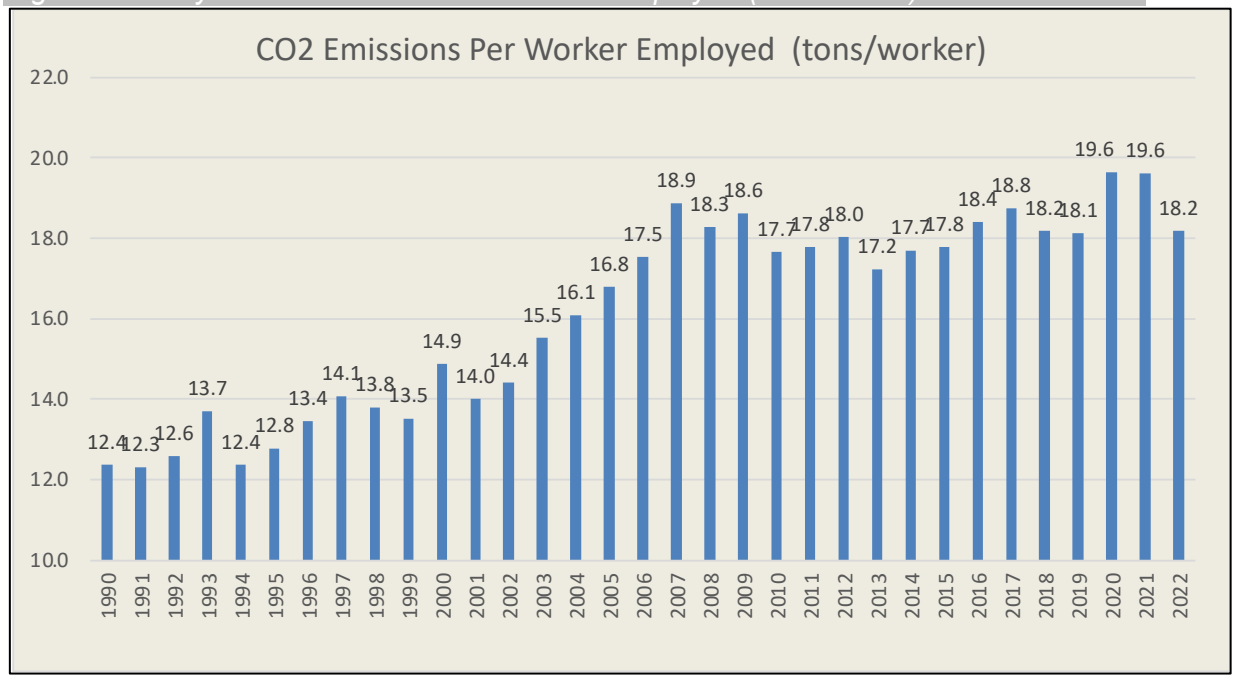
Thus, in the words of Yeldan (2024), "*Türkiye displays typical characteristics of a developing / emerging economy with high energy deficiency, a historically given, structural imbalance of the savings – investment gap, and a lopsided, highly volatile rate of growth mostly driven by the speculative in- and out-flows of hot money finance*." Thereby, it is in a conjuncture where the urgency for a new growth model is increasing, as the country has yet to realize the necessary *decoupling* between growth and carbon reductions.

Türkiye emits around 5 tons of carbon dioxide (CO2) per person as of 2020; and the country's total CO2 eq. emissions per $GDP (in constant 2015 US dollars) is 0.400 kg.[3] Yet, as a complement to these indicators, Türkiye is also mentioned as one of the top three nations revealing the fastest rate of increase in *per capita greenhouse gas emissions* (Orhangazi & Yeldan, 2023b). Türkiye recorded a cumulative rise in CO2 equivalent emissions of 144%, rising from 214 million tons in 1990 to 558 million tons in 2022. According to Acar et al. (2018), under a "*low commitment*" scenario, global CO2 emissions are expected to reach 680 million tons by 2030.

It is well recognized that the persistent increase in carbon intensity is one of the most important technological characteristics of this expansion that is driven by speculation-led growth. In addition, late industrializers are known to further face the pressures of structural unemployment. Because of this, one of the most important results of this trajectory has been the significant increase in emissions per worker employed. Emissions per labor employed are recorded at around 13 tons per worker from 1990 to 2001, and then begin to increase starting 2006, going from 14.4 tons per worker in 2002 to as much as 19.6 tons per worker in 2020 and 2021. This can be directly followed from Figure 1. According to the most recent data, the amount of carbon dioxide emissions produced by each worker employed in 2022 is scored at 18.2 tons.

[3] Comparative data adapted from the World Bank Development Indicators (Environment, Social and Governance (ESG) Data) at https://databank.worldbank.org/source/environment-social-and-governance-(esg)-data

Figure 1. Türkiye: CO2 Emissions Per Worker Employed (tons/worker)



Source: Turkstat: Environmental Statistics, Household Labor Force Surveys

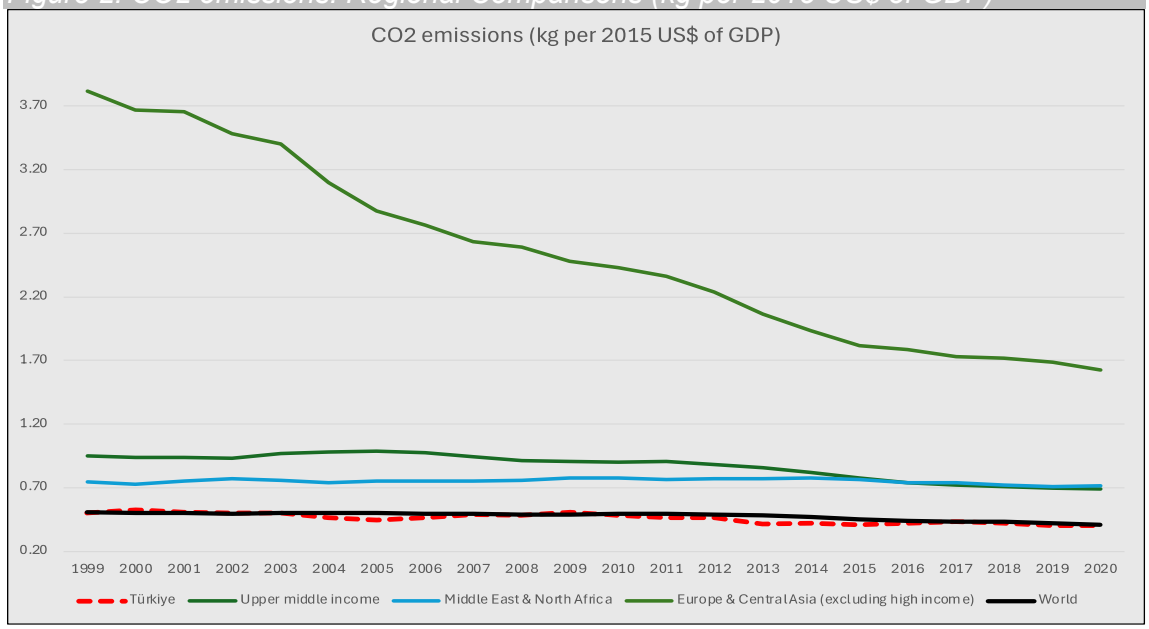
The observed increase in the carbon intensity of employment is mostly attributed to the overall rise of capital intensity of production by many researchers (see *e.g.*, Orhangazi & Yeldan, 2023b; Yeldan 2024, TMMOB, 2024). Data disclosed by the *University of Groningen, Penn World Tables*, for instance, reveal that utilization of capital per worker employment has doubled in Türkiye, from 1989 (completion of Türkiye's capital account deregulation) to the eruption of the global financial crisis in 2009, from 4 thousand TL to 11,600; and then hovered around that rate for the remainder of the 2000s up to date (measured in fixed 2017 TL prices). As the domestic technological mix shifted towards capital against labor, the CO2 content of production unavoidably trended upwards due to heavy reliance of fossil fuels in the utilization of physical capital under the existing energy composition. This shift, in turn, had been ultimately due to the response to an overvalued foreign exchange and artificially cheapened capital prices, which had been the characteristic of the Turkish asset markets.

The secular rise of capital per labor employed has, in fact, been an indispensable characteristic of many emerging market, developing economies which had prematurely deregulated their capital accounts in an attempt to integrate with the global financial markets.[4] Given the constraints of the international financial markets, indigenous developing economies are observed to be trapped within a relatively high-interest rate trajectory due to the ongoing threat of capital flight. Accordingly, a resurgence in capital inflows lead to a relatively overvalued real exchange rate, and result in widening current account deficits as both the consumption preferences and patterns of production become increasingly dependent on (now cheapened) imports.

[4] For more elaboration, see., University of Groningen Penn World Tables at https://www.rug.nl/ggdc/productivity/pwt/?lang=en

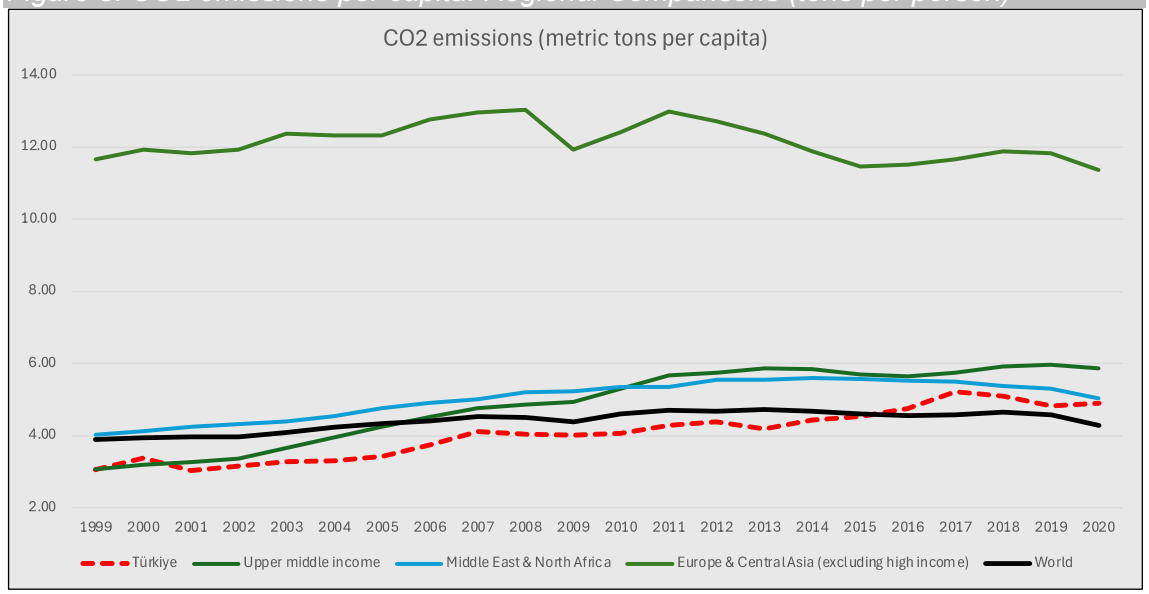
In contrast to these observations that are arguably a common trait of the developing world, Türkiye's CO2 inventory compares favorably in most respects with economies in the region as well as its competitors at the global scale. Data from the World Bank Development Indicators reveal that Türkiye's *CO2 emission intensities* compete favorably against both the upper middle-income group and the Middle East & North Africa regional economies. Türkiye's CO2 emissions per dollar GDP (measured in fixed 2015 US$ international prices) declined from 0.522 kg to 0.401 kg over 2000-2020, at a rate of 1.43 per annum. (See Figure 2). In contrast, CO2 emissions per dollar GDP stand at 0.690 kg for the upper middle-income group and at 0.712 kg for the Middle East & North Africa region. Türkiye's and both of these regions' performances in CO2 intensity fare comparably better against the Europe & Central Asia region (high income countries excluded). Yet even so, data displayed in Figure 2 below underscore that this latter group of countries had succeeded reducing their emissions intensity at an average rate of 3.34% over the last two decades. Even so, they still display about three-folds of CO2 emissions per dollar GDP scale against Türkiye and others.

Figure 2. CO2 emissions: Regional Comparisons (kg per 2015 US$ of GDP)



Source: World Development Indicators: https://databank.worldbank.org/source/world-development-indicators#

Figure 3. CO2 emissions per capita: Regional Comparisons (tons per person)



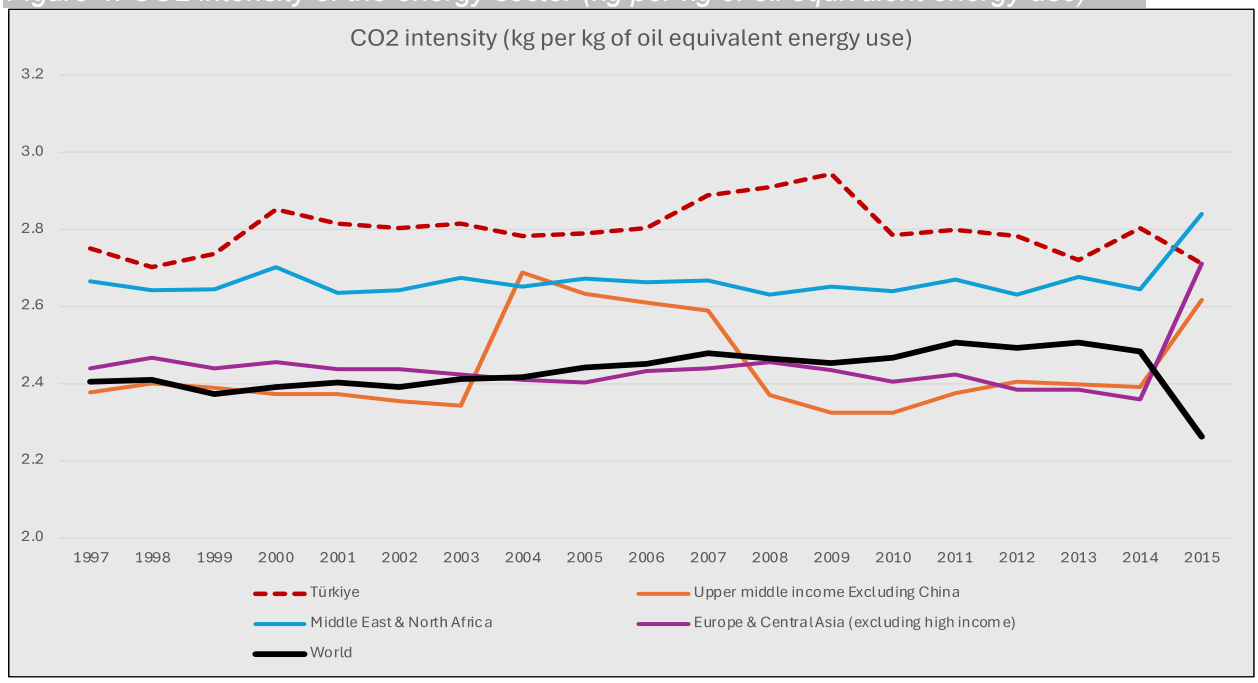
Source: World Development Indicators: https://databank.worldbank.org/source/world-development-indicators#

In comparison with the *per capita* emissions, Türkiye also displays comparably favorable results with those three groups of regions. Türkiye's per capita CO2 emissions in 2020 stand at 4.885 kg per person, and is lower than its counterparts in the upper middle-income group 5.876 kg; Middle East and North Africa 5.034kg, and the Europe and Central Asia group 11.372 kg (see Figure 3). In contrast to all, the World average of per capita CO2 emissions stand at 4.292kg. Yet, it still should be noted that, both the upper middle-income (and Middle East & North Africa regions) as well as Türkiye reveal higher rates of growth in their per capita emissions in comparison to the global average annual growth (Türkiye: 1.85%%, upper middle income countries[5]: 3.07%, and Middle East & North Africa: 0.99%). For this indicator, the Europe and Central Asia region displays a negative annual rate of growth at -0.294%, while the world average rate of growth of per capita CO2 emissions is calculated to be 0.41%.

These numbers carry their qualitative comparisons with respect to emissions intensity in the energy sector. Measured in "*kg CO2 emissions per kg of oil equivalent energy use*", World Bank data disclose that Türkiye's CO2 intensity in the power sector has declined from 2.85 kg in 2000 to 2.71 kg in 2015, revealing an average rate of decline of 0.34% per annum. As of 2015 (the most recent data point supplied by the World Bank data set), this indicator is slightly higher with respect to the upper middle-income region (2.62 kg) and is lower than that of the Middle East and North Africa region (2.84 kg). The world average, on the other hand, is comparably low at 2.26 kg, and reveals a decline at an annual average rate of 0.37% per annum. (see Figure 4)

[5] It has to be noted, however, that in the upper middle income group of countries China plays a leading role in boosting the CO2 intensities. Excluding China, the upper middle income group scores an increase of per capita CO2 emissions at lower average rates of growth of **1.17** kg/person, and **-1.76** kg per US$GNP, respectively. (Calculations are carried out with data from the World Bank Development Indicators).

Figure 4. CO2 intensity of the energy sector (kg per kg of oil equivalent energy use)



Source: The World Bank, World Development Indicators. https://databank.worldbank.org/source/world-development-indicators

Yet, as stated under footnote 5 above, recasting the same comparison against the upper middle-income group of countries *with China being excluded*, Türkiye's relatively high standing in CO2 emissions per energy use becomes more pronounced.

According to TURKSTAT, CO2 emissions from the energy sector have more than doubled since 1990 and are expected to continue to rise significantly in the medium and long term, closely following the growth in energy demand. In fact, the most critical aspect of Türkiye's power sector is its over-reliance and deep dependence on imported sources of energy. As highlighted in the background papers by Orhangazi & Yeldan (2023b) and Yeldan (2024), increased import dependence on energy and strategic intermediates is a key problem of not only the power sector, but also the whole economy as it contributes to current account deficits.

2. An Assessment of Existing and Planned Strategies Towards Green Transformation

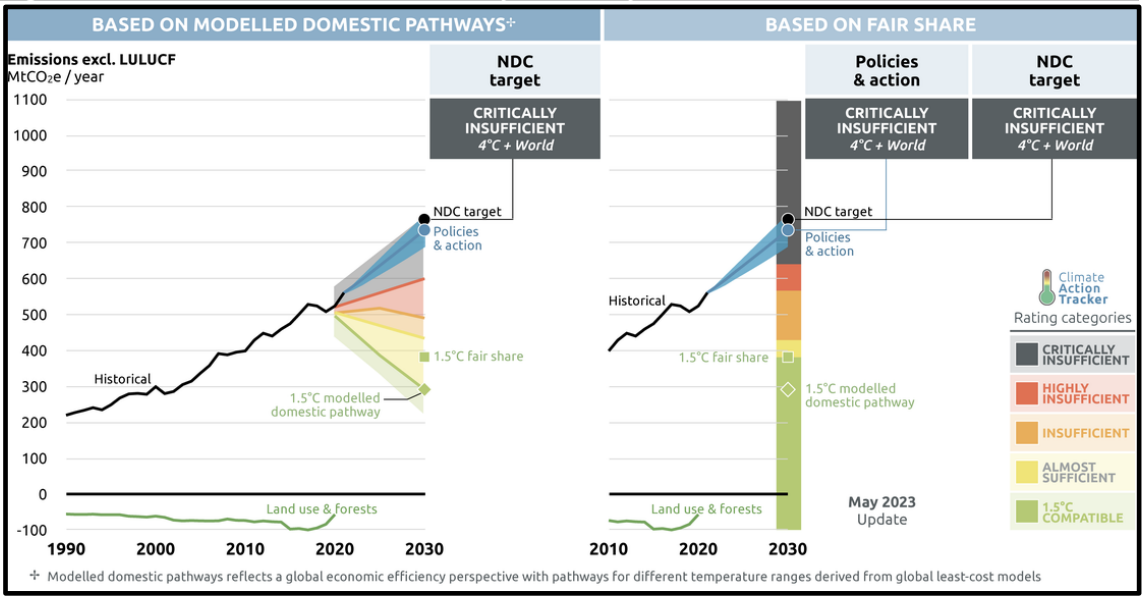
Along with her peers of the developing & emerging market economies, Türkiye clearly shares the main tacit dilemma of tradeoffs between maintaining *energy security versus exercising her right to development*. Türkiye is currently working toward the implementation of a domestic industrialization plan that is oriented around the adoption of renewable energy sources and the promotion of sustainable economic growth. Achievement of this objective is not at all simple. The economy is heavily dependent on imported key resources and foreign technologies, which sets a substantial barrier to its ability to maintain its energy security. As has been noted above, the economy has significant structural constraints in preserving its energy security.

First and foremost, the ability of Türkiye to sustain a steady influx of foreign cash is essential for all these reasons; however, the country is unable to accomplish this through exports, tourism, or remittances. As a result, the environmental indices of the Turkish economy are deteriorating because of the challenges that it is facing in securing a cost-effective energy supply for its industrialization initiatives and maintaining energy security.

The highlighted "tacit dilemma" over the potentially negative trade-offs between *energy security versus developmental objectives* led many researchers and international institutes to search for a viable balance in setting the climate goals for the developing economies. The *Climate Equity Reference Calculator* of the Stockholm Environment Institute[6] or the Fair Share Assessments of the *Climate Action Tracker*[7] are examples of such efforts. Within this domain, The Climate Action Tracker (CAT) network rates Türkiye's updated Nationally Determined Contribution (NDC) target as "**critically insufficient**" when compared with her "**fair share contribution**" to climate action. Accordingly, this rating indicates that Türkiye's NDC target reflects *minimal to no action* and is reported as *not at all consistent with limiting warming to 1.5°C*. The CAT assessments underline that "*Türkiye's target is not in line with any interpretation of a fair approach to meeting the 1.5°C temperature limit*"; and continues to caution the international community that "*if all countries were to follow Türkiye's approach, warming would exceed 4°C*".

CAT researchers summarize Türkiye's international standing across many indicators covering the official (revised) NDC pathway, as well as against the officially documented domestic modelling pathways and efforts over generating climate finance. Summary of CAT's assessments for Türkiye are displayed in Figure 5.

Figure 5. Climate Action Tracker: Türkiye Country Assessment:



Source: Climate Action Tracker, https://climateactiontracker.org/countries/Türkiye/targets/

[6] https://www.sei.org/tools/climate-equity-reference-calculator/

[7] https://climateactiontracker.org/countries/Türkiye/net-zero-targets/

CAT upholds its assessments in stating that

"*In the last two decades, Türkiye has experienced a large increase in energy demand which has resulted in Türkiye becoming heavily dependent on oil, coal, and fossil gas imports. Türkiye's continued reliance on fossil fuel imports is not only a burden on the economy, but also leaves the country vulnerable to volatile commodity markets, exacerbated by the illegal Russian invasion of Ukraine and the depreciation of the Turkish lira. Despite the global climate crisis and the need for the world to get off fossil fuels, Türkiye plans to become a fossil gas hub*".

On a point-by-point basis, CAT's assessments are based on the following nodes:

- **Emissions coverage**– The roadmap produced by Türkiye's Climate Council mentions methane and carbon dioxide, but it is not clear whether all GHG emissions are covered. All sectors of the economy excluding international aviation and shipping, are covered by the roadmap but it does not provide quantified targets.
- **International aviation and shipping**– Türkiye has not provided any information on its intention to cover international aviation and shipping.
- **Reductions or removals outside of own borders**– It remains uncertain whether Türkiye intends to use international offset credits to meet its net zero target. Türkiye intends to include the legislation on offsetting by 2024 within the scope of its yet-to-be-established Emissions Trading System.

Target architecture

- **Legal status**– Türkiye included its net zero target of 2053 in its latest climate policy roadmap developed by the country's Climate Council in February 2022 (Ministry of Environment, 2022). Türkiye has yet to submit its LTS to the UNFCCC.
- **Separate reduction & removal targets**– Türkiye provides no information on its intention to communicate separate emission reduction and removal targets.
- **Review process**– Türkiye provides no information on its intention to establish a review cycle for its net zero and intermediate targets.

Transparency

- **Carbon dioxide removal**– Türkiye does not provide transparent assumptions on carbon dioxide removals.
- **Comprehensive planning**– In June 2022, Türkiye released a roadmap to achieve its net zero target. The roadmap includes 217 policy measures and action; however many are lacking in detail and the potential emissions reductions are not quantified (Ministry of Environment, 2022). The roadmap also does not include an emissions pathway compatible with achieving its target. Türkiye was also expected to submit an LTS by the end of 2022, but has yet to do so.
- **Clarity on fairness of target**– Türkiye makes no reference to fairness or equity in the context of its net zero target.

Source: Climate Action Tracker, https://climateactiontracker.org/countries/Türkiye/targets/

On a positive note, it ought to be underlined that Türkiye has made significant progress towards its energy goals with the introduction of the *National Energy Plan for 2035*, and the *2053 Long Term Climate Strategy* document presented to the 29 COP meetings (UNFCC, 2024). The *Climate Strategy* document aims to increase the country's solar power capacity from 6.7 GW in 2020 to 82 GW, while also quadrupling its total wind & solar power capacity to 120GW, by 2035.

In addition, Türkiye has implemented a limited range of measures to decrease transportation emissions and intends to produce its own electric cars (EVs), with the sales of the initial model that had commenced in 2023. This is expected to further

enhance international competitiveness of the Turkish automotive sector and is expected to serve as a significant opportunity to stimulate local sales of electric vehicles. In 2020, the market share of electric vehicles (EVs) in Türkiye was below 1%. Thereby, shifting quickly towards renewable energy sources instead of increasing the production of fossil fuels within the country would greatly assist Türkiye in attaining its net zero objective under a more effective pathway.

Türkiye's *Long-Term Climate Strategy* (UNFCC, 2024) was developed under the coordination of the *Ministry of Environment, Urbanization, and Climate Change*, along with the *Presidency of Strategy and Budget of the Republic of Türkiye*. It not only outlines strategies for climate change mitigation and adaptation sectors but also addresses sectoral strategies related to technology, just transition, climate finance, and capacity building. Among its specific targets one can numerate that,

- by 2030, primary energy consumption will be reduced by16%, preventing 100 million tons of CO2 Emissions. Nuclear energy installed capacity will be increased to 4.8 GW
- by 2035, Energy intensity will be reduced by 35%. Installed capacity of solar and wind energy will be increased fourfold and nuclear energy installed capacity will be increased to 7.2 GW; and
- by 2053, the share of renewable energy in primary energy will be increased from 17% to 50%.

As for the industrial processes, the *Long-Term Climate Strategy* Document mentions the following core targets: (*ibid,* p. 25):

- In the steel sector, total emissions could be reduced by 20,6% by 2040 and by 99,7% by 2053 *compared to a scenario based on current policies* and conditions. The total investment required to achieve net zero, considering all feasible low-carbon technologies and supportive financial and regulatory policies, is estimated at approximately $33.6 billion.
- For the cement sector, it is estimated that the sector’s total emissions could be reduced by 29.8% by 2040 and by 92.8% by 2053 *compared to a scenario that takes current policies* and conditions into account, with the total investment cost for transformation over the next 30 years estimated at $29.8 billion.
- In the aluminum sector, projections indicate that total emissions could be reduced by 53% by 2040 and by 75% by 2053, *relative to a baseline scenario* based on current policies and conditions. The estimated total investment required for the sector is $4.4 billion.
- For the fertilizer sector, a complete reduction of emissions by 100% is targeted for 2053, with an expected investment cost of $5.3 billion.

Based on these observations, a set of key recommendations would seem apparent to enhance Türkiye’s abatement policies for meeting her commitments in the international arena:

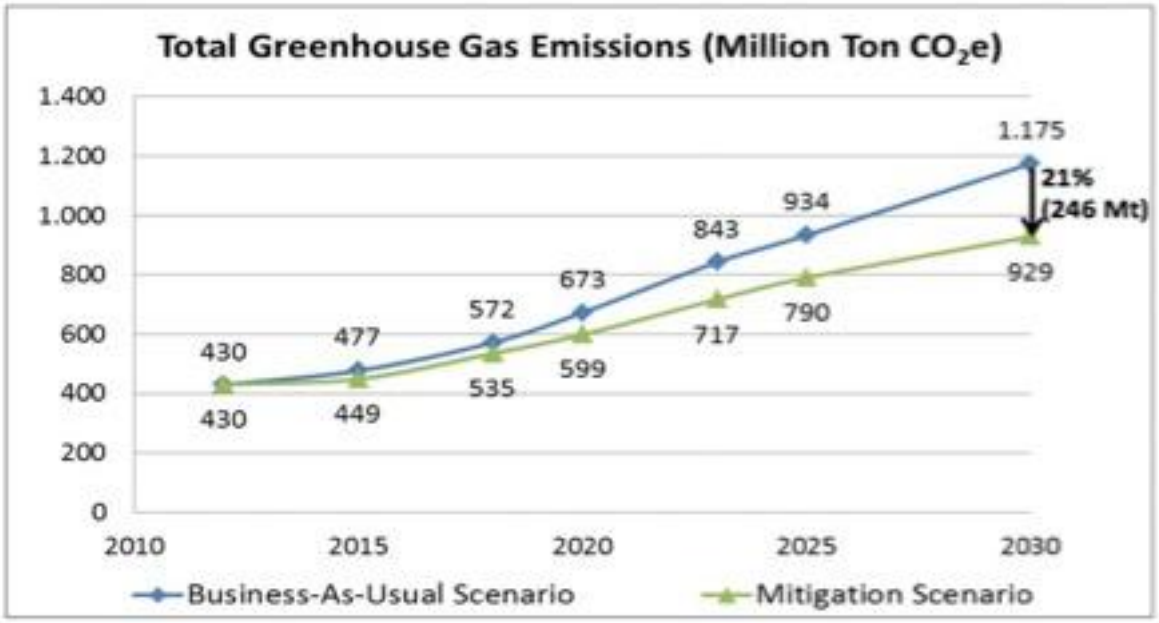
- Instead of investing more in local lignite coal and fossil gas production, the focus should be on maximizing the country's significant renewable energy potential. This will further serve to minimize reliance on imported fossil fuels, prevent long-term dependence on fossil fuels, and enhance energy security.
- Create a comprehensive strategy to gradually eliminate the use of coal in the power industry and introduce economically feasible and socially inclusive policies to ensure its effective execution.

- Establish a more ambitious and analytically more credible Nationally Determined Contributions (NDC) whose objective clearly sets a target for 2030 that surpasses existing regulations and actively facilitates the reduction of greenhouse gas emissions.

2.1. Evaluating Türkiye's NDC Pathway and the Proposed Domestic Emissions Trading System (ETS)

Türkiye shared her very first analytical plan to sustain the NDC commitments back at the 2015 Paris COP meetings.[8] The proposed study assumed a *business-as-usual* pathway based on the historically observed emission trends of Türkiye between 1990 and 2015. Given this projection, the NDC proposed a reduction of aggregate greenhouse gaseous emissions by 21% by 2030. The official NDC projection and its commitment pathway are depicted in Figure 6.

Figure 6. Türkiye's Official INDC as Submitted to the 2015 Paris COP Meetings



Source: INDC of Türkiye
https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Türkiye/1/The_INDC_of_TÜRKIYE_v.15.19.30.pdf

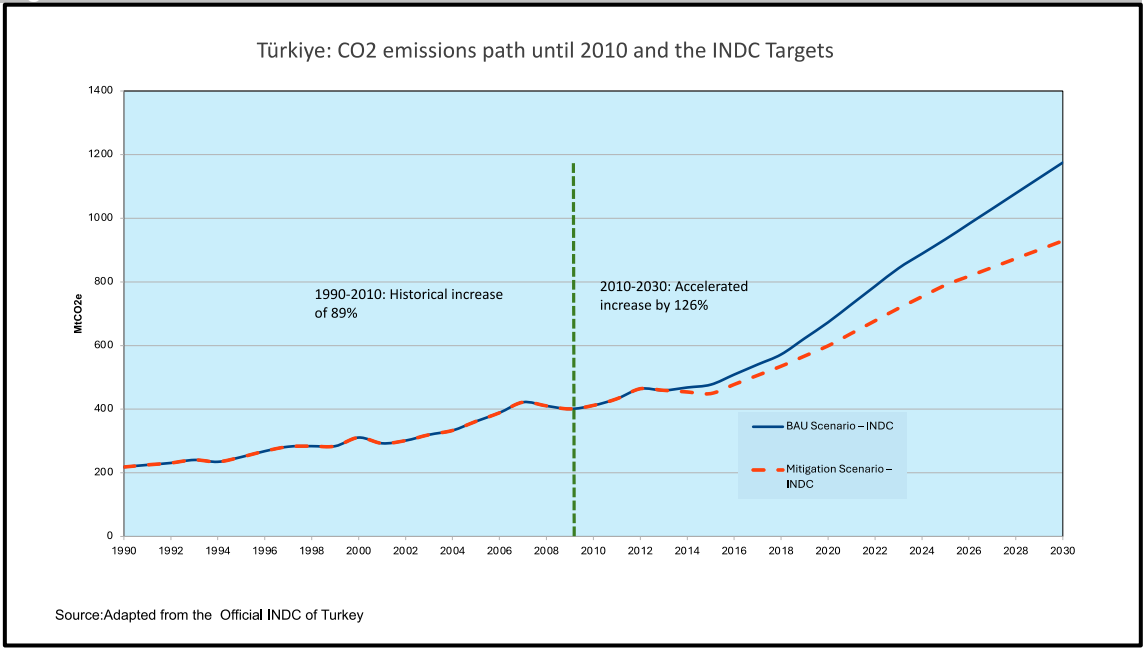
This NDC abatement plan has been criticized by many researchers and NGOs[9] for its erroneous assumptions and rather poor analytical framework. In particular, the assumed business-as-usual pathway has been found to be unrealistic and that it does not fit post-1990s historical facts. For one, the post-2015 business-as-usual scenario assumes an exceedingly accelerated rate of growth in GHG emissions and brings the total emissions to 1,175 million tons in 2030. It is observed that over the twenty years from 1990 to 2010 Türkiye's emissions had increased at a cumulative rate of 89%. By contrast, the *business-as-usual* pathway scenario over the next twenty years from 2010 to 2030

8 https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Türkiye/1/The_INDC_of_TÜRKIYE_v.15.19.30.pdf
9 See, e.g., Climate Action Network, Yeldan, 2023; Şahin et. al., 2021; Şahin, 2016; Voyvoda and Yeldan, 2015.

claims that the cumulative rise of Türkiye's emissions would reach 126%. Based on this exaggerated pathway, it was officially set to be reduced by 21% to 930 million tons by 2030 (relative to the 2012 reference). This target was then revised in 2023 to achieve a reduction of 41% (relative to 2012 reference) to 695 million tons by 2030.[10] Accordingly, Türkiye also shared its intention to peak its emissions in 2038, the latest.

These assumptions are displayed in Figure 7 below.

Figure 7.



Given the NDC plan of action, Turkish authorities had also initiated significant steps to effectively price carbon, and to get ready for the establishment of a domestic *emissions trading system (ETS)*. The ETS is to be institutionalized within the newly proposed *Climate Law*.

Administration of the ETS necessitates a three- step action agenda:

- *first* set limits of an upper quota that determines the aggregate level of carbon emissions;
- *second*, optionally supply market agents with a stream of "allowances" that give them the right to emit carbon for the amount of the quota;
- finally, create an institutional mechanism –a market, where agents trade these "allowances" as they find individually cost-effective to given their own investment decisions.

Traditional economic theory argues that the simplicity and straightforwardness of this carbon trading mechanism is the fundamental advantage it offers. In accordance with this idea, it is anticipated that the market has full knowledge and command over the total number of rights that are awarded in each sector, and that the agents are free to make decisions based on the information they have access to. Yet, it is clear that for the carbon quota to be effectively implemented, it must be effectively *binding*. Otherwise, if all

10 For the 2023 revision of Türkiye's (revised) NDC, see, https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf

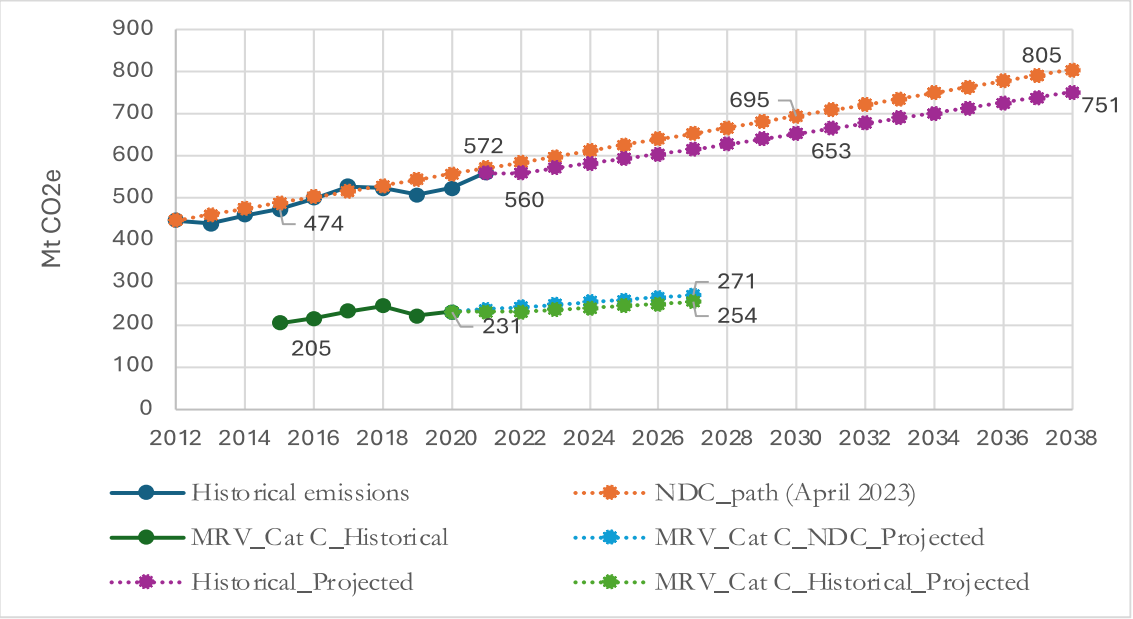
agents were content with the allowances that have been allotted to them initially, there would be very little motivation to engage in trade. Indeed, this was demonstrated by the rather dismal performance of the *European Emissions Trading Scheme* over the period 2005-2012, when the market was unable to function efficiently at satisfactory price levels due to over-allocation of the initial allowances exceeding the set quota levels (see UNEP 2019, for more elaboration of the history of the European ETS episode).

It is yet too early to assess the efficacy and impact of this mechanism, with an early analysis by Aşıcı (2023) serving as the most commendable evaluation thus far. Accordingly, the Turkish ETS has been announced to be initiated in 2025, where the scheme will replace the *Monitoring-Reporting-Verification* (MRV) system that had been enacted back in 2017. As had been set out by the officially declared regulations, in the sectors of electricity, refinery, non-metallic minerals, basic metals, paper and chemicals, those enterprises emitting above a threshold level of GHGs (> 500 ktCO2e) will be covered under the ETS regulations. As of 2020, 476 installations that had been listed under the Turkish MRV system were responsible for a total of 251 million tons of CO2e (MtCO2e). This corresponds to 48.2% of the aggregate 520 MtCO2e total emissions in that year.

Aşıcı (2023) starts his analysis by noting that the Turkish ETS cap had been announced to follow the projected emissions under the announced NDC in April 2023 (see Figures 7 above and 8 below). Here, as explained, Türkiye pledged to limit emissions to 695 MtCO2e in 2030, and to 805 MtCO2e in 2038 (peak year). According to the Turkish NDC, Turkish emissions would reach to 1,175 Mt CO2e by 2030 under the *Business-as-Usual* (BaU) scenario. As documented in Figure 8, Turkish authorities pledged to limit emissions to 695 MtCO2e in 2030, which corresponds to a 41% decrease from BaU. Historical emissions, however, reveal an entirely different path, and as argued above, under a more realistic analytical set of assumptions Turkish emissions are expected to reach to 653 MtCO2e in 2030, and to 751 MtCO2e in 2038, both well below the levels reflected in the NDC.

This calculation means that employing the official NDC projected emissions rather than emissions reflecting the historical trend would cause *a 17 million oversupply of allowances in 2027* (when the transition phase ends). Hence, there is a risk for the Turkish ETS to face extremely low carbon, if not zero, carbon prices. To avoid this outcome, Aşıcı warns, the Turkish NDC must be revised to reflect actual and expected trends in GHGs emissions.

Figure 8. Historical and Projected GHGs Emissions in Türkiye (MtCO2e)



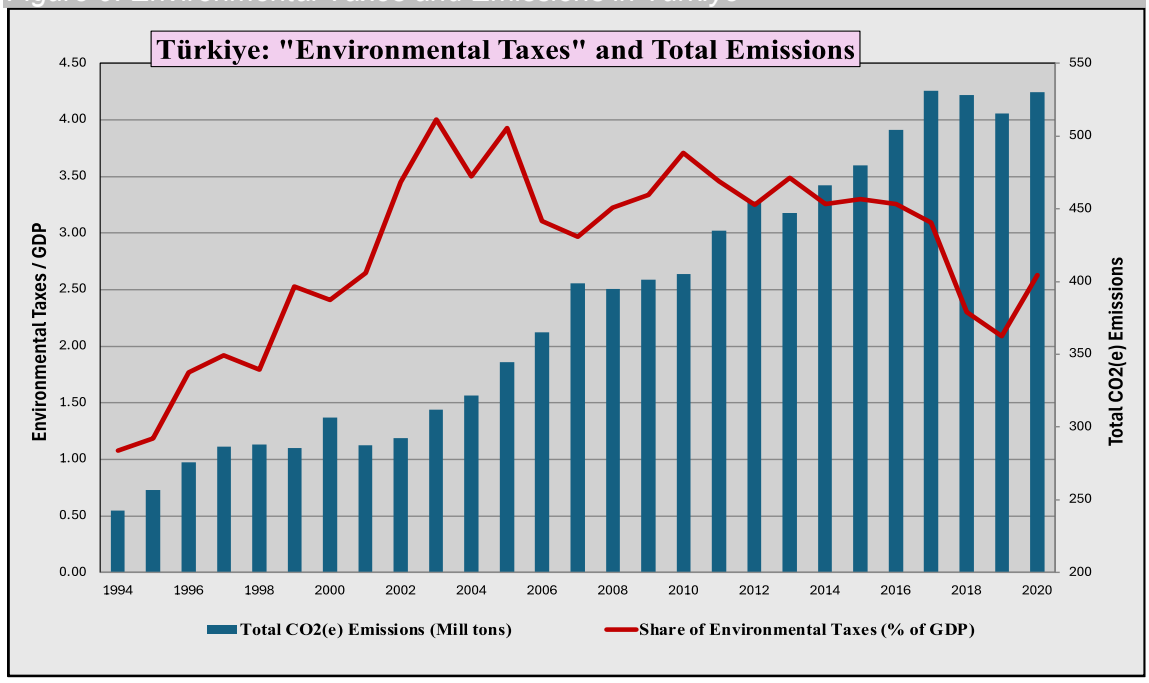
Sources: Calculations by Aşıcı (2023) based on data and projections from the Climate Action Tracker network; Turkish Ministry of Environment, Urbanization and Climate Change.

2.2. Alternative Policies to Price Carbon: Earmarking Environmental Tax Monies

When the matter is one of *pricing carbon*, its ought to be noted that the market-driven methods of the ETS are by no means the only alternative. It is known for instance that the Turkish economy does in fact carry a very significant burden of, in the terminology of the OECD, *environmental taxes*. Türkiye has already implemented quite high tax rates on several types of energy, municipal waste, and manufacturing, according to the OECD's classification. These taxes typically amount to approximately 2.5 to 4.0 percent of Türkiye's gross domestic product. However, this strategy lacks a concrete plan to use the tax funds specifically for the purposes of reducing, lessening, and adjusting to the effects of climate change. The absence of clear policy instructions is clearly demonstrated by the rise in overall emissions notwithstanding a substantial tax burden.

Figure 9 is based on OECD data and shows that environmental taxation is indeed significant for the Turkish economy. Nevertheless, this observation suggests that a further step towards carbon pricing might serve as a relatively easier policy intervention. Rather than imposing *additional carbon taxes* (or introducing other instruments of CO2 pricing), if the existing administrative capacity on environmental taxation can be earmarked towards enhancing climate abatement funds, Türkiye may well be in a position to achieve a second-best solution at minimal cost.

Figure 9. Environmental Taxes and Emissions in Türkiye



Source: OECD, Environmental Taxes data base. https://data.oecd.org/envpolicy/environmental-tax.htm

However there remain important complications. Türkiye's ambitious plans for implementing renewable energy face further obstacles due to the persistence of subsidies for coal-fired power generation and coal mining. These subsidies include the capacity remuneration mechanism, regional development packages with investment support and loan guarantees, as well as direct Treasury transfers to the sector. As an example, SHURA in its 2019 Report has shared its assessments of the monies involved in fossil fuel subsidization and concluded that in 2018 the total amount of market and non-market transfers reached was US$8 billion $. Of this, 3.9 billion had been directed to the production and consumption of fossil fuels. These numbers can be viewed from a modelling angle provided by Acar and Yeldan (2018) who conducted an applied macroeconomic modelling study on the influence of fiscal subsidies for coal on aggregate CO2 emissions. Acar & Yeldan's calculations suggest that eliminating these subsidies might have lowered gaseous emissions by 5.5% over the base run trajectory from 2015 to 2030.

3. Sectoral Strategies for Green Transformation: An Overview of policy recommendations in background research papers

Now we turn to a synthesis of policy recommendations made in the sectorial and thematically specific reports provided as background studies. First and foremost, comes the energy sector.

3.1. Energy

As expected from a rapid developing economy, Türkiye has been experiencing a dramatic change with respect to its escalated utilization of electricity and primary energy

sources. Over 400 Mton CO_2 equivalent (CO_2e) emissions of the total GHG emissions around 560 Mton CO_2 equivalent (CO_2e) originate from the energy sector (TURKSTAT, 2024a); thus, the mitigation pathways in the energy sector will play a crucial role in achieving net-zero target. As discussed at length in the background papers by Kat (2024, on energy) and Orhangazi & Yeldan (2023b, on the overall macroeconomy), Türkiye has been facing increased energy demand in the recent decades in line with its growing population and GDP. The bulk of electricity generation stems from the utilization of fossil fuels, comprised of mainly natural gas and coal. Since the country does not own any significant oil or gas reserves, it is highly dependent on energy imports. Import dependence on energy is not limited only to oil and gas, but Türkiye imports an increasing share of its total coal supply, which has reached to 55% of the total by 2022 (SEFIA, 2024).

To infer a more comprehensive view of the energy economy, it would be instructive to study the general energy balances data. Table 1 summarizes the main components of the energy supply and demand flows across its sources and usage for 2002 to 2022 (the last available data at the time of writing).

Table 1. Türkiye, General Energy Balances: 2002-2022

	'000 Toe			Share in Total (%)			Avg Annual Rate of Change (%)	
	2002	2010	2022	2002	2010	2022	2002-2010	2010-2022
Domestic Production	24,430	31,558	50,830	31.70	29.80	32.22	3.20	3.97
of which Coal	11,538	16,214	18,967	14.97	15.31	12.02	4.25	1.31
of which Renewables[1]	322	683	5,326	0.42	0.64	3.38	9.39	17.12
Imports	57,156	84,606	125,129	74.16	79.90	79.31	4.90	3.26
of which Coal	8,342	14,423	23,651	10.82	13.62	14.99	6.84	4.12
Exports (-)	3,162	7,991	10,893	4.10	7.55	6.90	11.59	2.58
Total Primary Energy Supply	77,075	105,888	157,770	100.00	100.00	100.00	3.97	3.32
Generation and Energy [2]	-17,590	-26,048	-37,332				4.91	3.00
Electricity Plants[2]	-11,580	-19,964	-31,350	100.00	100.00	100.00	6.81	3.76
of which Coal	-8,121	-13,037	-25,678	70.13	65.30	81.91	5.92	5.65
of which Renewables[1]	-4	-251	-4,457	0.04	1.26	14.22	51.33	23.98
Total Energy Consumption	59,486	79,840	120,438				3.68	3.43
Consumption of Industry	23,022	26,077	37,753	100.00	100.00	100.00	1.56	3.08
of which Coal	8,693	8,641	9,447	37.76	33.14	25.02	-0.07	0.74
of which Renewables[1]	119	130	85	0.52	0.50	0.22	1.11	-3.57

1. wind and solar
2. Net of Petroleum and Electricity usage

Source: TR Ministry of Energy and Natural Resources

We observe that over the last two decades Türkiye's total primary energy supply has increased by 80.695 million TOE at an annual rate of 3.5% (with 3.97% during the first, and 3.32% under the second sub-period; see table 2). Coal (domestic plus imported) has contributed with a cumulative increase of 20.232 million TOE (with a cumulative expansion of 95.7%; and natural gas contributed by 28.940 million TOE via a cumulative rate of increase of 198.2%. Over the same period sources from hydro expanded by 2.848 million TOE with a rate of 98.3%; and the sources from geothermal, wind and solar expanded with 15.702 million TOE disclosing a cumulative rate of 1,375% (See Table 1).

In a nutshell, the above data concludes that Türkiye's post-1980 growth had been strongly energy intensive. Total primary energy consumption has tripled over 1980-2020 from 600 terawatt hours (TWh) to 1,800 TWh. When assessed on a per capita basis, this meant doubling of energy consumption from 10,350 KWh in 1980 to 20,700 KWh by

2020. Orhangazi & Yeldan (2023b) and Kat (2024) report in their assessments as background studies to this Project, that this official policy stance is clearly visible under all the recently enacted *Development Plans* as well as the strategy documents of *MENR*. Boosting coal mining and coal-fired electricity generation appears to be among the priorities of the country, with a strong emphasis on the need to increase investments, extend exploration and rehabilitation budgets, and introduce new incentives to the coal sector. In order to attain such targets, investments in the sector are projected to accelerate with plans for exploration of new reserves.

No doubt, achieving net-zero emissions requires a complete reduction in carbon-intensive energy sources by the target year, 2053. Yet, although there are studies that emphasize the technical feasibility of phasing-out coal power plants by 2030 or 2035 (e.g. Kat et al., 2023; SEFIA, 2024), the *National Energy Plan* (MENR, 2022) does not propose a concrete phase-out plan for the coal power plants. Transitioning to renewable energy sources necessitates substantial investments in infrastructure, technology, and human capital where only the investment requirements for new plants are projected to reach an annual amount of 4.7 billion US$ (Acar et al., 2018; Kat, 2023) in the medium-term. Securing financing and mobilizing resources for such investments may pose a challenge, particularly in the context of macroeconomic constraints and competing priorities.

Furthermore, as Kat (2024, background paper) underlines, integrating intermittent renewable energy technologies, i.e., wind and solar, into the grid while maintaining grid stability and reliability presents significant technical challenges. The power system needs effective balancing mechanisms to match supply with demand in real-time where inadequate balancing mechanisms may lead to voltage fluctuations, frequency deviations, and even blackouts. Thus, at the initial stages, upgrading the transmission and distribution infrastructure to accommodate the increased capacity of renewable energy sources needs to be on the fore front of the agenda.

In sum, Türkiye clearly has ambitious plans for deployment of renewable energy, and yet these are likely to be compromised by the continued existence of subsidies to coal-fired power generation and coal mining together with her regional development ambitions via investment support and loan guarantees (Orhangazi & Yeldan 2023b). This point is also underlined by the International Energy Agency (IEA) in its *2021 Energy Report* where it is stated that, even though "…*Türkiye has experienced impressive growth in renewables in the past decade* (notably solar, wind and geothermal), *still, fossil fuels continue to drive Türkiye's economy, with a heavy dependency on imports, especially oil and gas"*. Advances in renewables had been a conscious result of supportive government policies, while being "… *driven by a favorable resource endowment and strong energy demand growth*" (IEA, 2021, p. 24). IEA in its 2021 Report further concludes that, given limits on upstream resources and with consideration to emissions reduction, "*Türkiye should also place due consideration on cost-optimal demand-side measures such as efficiency improvements and fuel switching in the transport sector, which is still 98% reliant on oil"* (*ibid,* p. 25).

To conclude, in his background paper Kat (2024) spells out the following relevant policy recommendations:

- First, continuation and enhancement of the policies that support the development of renewable energy sources as well as storage

technologies are crucial. This includes maintaining encouraging feed-in tariffs (offering guaranteed and above-market price via long-term contracts), implementing transparent and efficient auction mechanisms, and providing incentives for renewable energy investments.

- Secondly, a more well-defined regulatory framework is needed to encourage and operationalize new business models, e.g., aggregation of consumers or cooperation among consumers, to overcome the existing barriers and limitations such as the perception that costs are high, lack of finance and information and complex institutional procedures.

- However, the import dependency problem is still on the table unless there exists a significant share of domestic production for the equipment needed in renewable power plants. In this context, current efforts on encouraging and prioritizing research & development activities and domestic production of promising technologies including energy storage systems and hydrogen should gradually increase.

3.2. Agriculture

While agricultural practices, land use intensity and carbon-based inputs vary from region to region, areas currently producing the bulk of the produce are those intensively consuming fossil-fuel-related inputs, such as mineral fertilizers, chemicals, and oil. According to official estimates, as of 2022 the agricultural sector is responsible for 12.8% of Türkiye's total CO2(eq) emissions.[11] This exceeds direct industrial production emissions. The breakdown of the emissions of the agricultural sector displays 19.23 MtCO2 by enteric fermentation in animal husbandry, 5.14 MtCO2 by fertilizer consumption, 16.87 MtCO2 by the land use in farming (TCÇŞİDB, 2024). In line with increasing number of animals and the fertilizer use in the last decade, the emissions of the agricultural sector notably increased.

Karakoç & Yeldan (2024, background paper) underline that the sustainable transition of agricultural production crucially depends on the efficient use of inputs and technology or, broadly speaking, advances in sustainable technical change. The bulk of small and medium-scale farmers are under the strain of short-term price and cost pressures, restricting the choices of inputs and technology to a short-term horizon. The authors thus note that the urgency to keep servicing debts and sustain the immediate livelihood of the family, combined with insufficient access to long-term capital and market opportunities, force farmers to switch to crops with higher immediate returns, use fertilizers and pesticides as tools to maximize the short-term yields, invest in irrigation if possible, and thus largely ignore the sustainability of farming.

Furthermore, the underlying structural problems in Turkish agriculture, such as the decline in land use and unfavorable demographic factors, compound the risks of reduced food security. On the other hand, there are growing attempts to transform the farming systems towards sustainable production. Nevertheless, climate change's cumulative and geographically varied effects bring unprecedented challenges.

[11] TURKSTAT, Environmental Statistics, https://data.tuik.gov.tr/Kategori/GetKategori?p=cevre-ve-enerji-103

The historical data and macro simulations that the authors present argue that although the challenges posed by sustainable transformation of agriculture are complex and profound, viable policy frameworks exist that can be combined to stabilize food supply, decarbonize the food production, and even increase farm incomes. Specifically, using a Computable General Equilibrium model, Karakoç & Yeldan document that an integrated agricultural-*cum*-industrialization strategy is likely to yield significant positive outcomes, including for farming communities' incomes, without risking declining food supplies through (1) re-switching to reduced dependence on chemical input use, (2) pricing carbon emissions with an introduction of taxation, and (3) inducing increased technical efficiency.

3.3. Industry

In his paper, Taymaz (2024) examines the development of the manufacturing sector in Türkiye and analyzes the sources of the declining CO2 intensity. His results indicate that manufacturing has a higher CO2 intensity than services, despite the fact its share in employment and value added decreased continuously from 2007 to 2017. Since 2017 there has been a slight increase in the share of manufacturing, but this may be due to conjectural factors such as the 2018-2019 crisis, Covid-19, and policy mistakes since 2021.

Taymaz classifies manufacturing sectors as "dirty" and "clean" according to their CO2 intensity and emissions. He finds that the share of dirty sectors in manufacturing has declined almost continuously since 2007. In the same period, the CO2 intensity of the manufacturing sector decreased from 0.31 kg/TL in 2007 to 0.18 kg/TL in 2021. Accordingly, *"the decomposition analysis of the factors behind the decline in CO2 shows that improvements in CO2 intensity at the firm level play an insignificant role*", with the main reason being "t*he decline in CO2 intensity is the inter- and intra-sectoral reallocation of value added*".

Green transformation can offer Türkiye an opportunity to focus on improving efficiency (including energy efficiency) necessary for achieving a sustainable and equitable growth. As Taymaz argues, to seize this opportunity Türkiye should abandon short-term driven policies aimed at temporary solutions for its macroeconomic problems, and implement long-term and systematic policies. The World Bank's 2022 CCDR report, for instance, suggests that Türkiye's 2053 net-zero path would require an investment of $68 billion in 2022-2030, but the benefits ($146 billion for 2022-2040) exceed the costs "through significant avoided energy imports, health gains, and other co-benefits."[12] Thereby, in the industrial sector, climate change and decarbonization policies should have two priorities: *decarbonization of electricity generation* and *structural change in industry*.

As narrated above, given the constrained potential for decarbonizing the most polluting sectors in the short to medium term, the primary policy objective should be to foster structural transformation towards high-wage, clean activities and sectors that develop new clean technologies and energy-efficient versions of existing products. Türkiye has developed expertise and capacities in metal-related industries, including consumer durables, machinery, and automobiles, enabling it to use its industrial foundation to manufacture "green products" such as wind turbines, batteries, electric vehicles, and

[12] As a point of contrast, UNCTAD's call for The New Collective Quantified Goal towards Climate Finance suggests that developing countries require around $1.1 trillion for climate finance from 2025, rising to around $1.8 trillion by 2030. See: https://unctad.org/publication/new-collective-quantified-goal-climate-finance.

energy-efficient consumer goods. It also possesses the capacity to generate high value-added parts of conventional items, including food and textiles. It is important to note that transitioning to green, energy-efficient, and high value-added sectors necessitates expertise and innovation in digital technology. The government ought to guide the private sector in advancing digital and green technologies by offering targeted funding for research and development initiatives. Taymaz notes that, as R&D support alone is inadequate to drive the business sector, the government must enhance its R&D policy by fostering demand for green and energy-efficient products and technologies through green public procurement and public entrepreneurship.

The primary disadvantage of augmenting the share of renewable resources, such as wind and solar energy, is their reliance on climatic circumstances. To ensure a stable electricity supply, the development of effective energy storage devices, including batteries and pumped storage, is essential, necessitating significant investment in these technologies. As renewable energy sources are inadequate for ensuring a reliable electricity supply with existing and forthcoming technologies, the development of new technologies for capturing and storing CO2 emissions from fossil fuels will be essential to attain the net-zero objective. Another facet of structural transformation involves diminishing the need for outputs from polluting sectors, including cement and iron and steel, by altering product design and replacing ecologically sustainable materials. As Taymaz underlines, Türkiye possesses unrealized potential for utilizing renewable resources, such as wood, as structural components in construction.

4. Social Policy and Gender Implications of Green Transition

It is a general assessment shared by many that the prevailing systemic inequalities are one of the biggest barriers to *just and fair (green) transformation*; and that, in the evolving global landscape, existing strategies to combat poverty and inequality must be revised. In contrast, mainstream (orthodox) economics typically regards economic growth as the main remedy for poverty; yet fails to appreciate that *the environmental degradation caused by very growth in fact primarily hits the people under poverty* (OECD 2024). To address this paradox, green transition / green economic models, such as *triple dividends* have been proposed. The main characteristic of this approach is to *reduce the ecological footprint* while at the same time improve access to the goods and services necessary to *create employment opportunities* and *benefit from human rights* (Cited in OECD, 2024: United Nations 2020).

This thematization has been analyzed in-depth in Terkoğlu-İzdeş's paper (Terkoğlu-İzdeş, 2024, background paper) which articulates the subject matter in detail under the historical conditions of Türkiye. She attests that "*ample evidence in gender and development literature as well as Türkiye's experience in prior industrialization strategies implemented present that unless specifically targeted, no form of industrialization or transition promises more equitable outcomes. Industrial development driven left to market forces do not have transformative mechanisms to address gender biases. It is governments to commit to gender equality and incorporate gender considerations into their industrialization strategies to ensure inclusive outcomes. In this regard, to turn green transformation into an opportunity to achieve more sustainable, just and egalitarian transformation the government's role in enacting policies, regulations, and incentives to bridge existing gender gaps is essential*."

Following these general recommendations, we distill the following Türkiye-specific policy recommendations for some specific issues and vulnerable groups from Terkoğlu-İzdeş (2024):

4.1. Role of Women

The Turkish labor market is characterized by deep structural gender inequalities. Thus, green transformation policies that fail to address the low participation of women, particularly in sectors that require transformation, such as fossil fuels, may result in the further exclusion of women and an exacerbation of the wage gap (Cited in Terkoğlu-İzdeş (2024): World Bank, 2022: 65). Furthermore, national policymakers dominantly aim at enhancing women's labor market entry and competitiveness principally through educational attainment. However, by giving almost exclusive predominance to individual-level constraints, these policies typically neglect the *demand-side factors* that influence employers' willingness to offer women decent work opportunities. Effective policies must therefore combine measures that alleviate *supply-side barriers* with initiatives that *boost demand for women's labor*, especially for those in marginalized groups, including the bottom 40% affected by race, ethnicity, religion, and other factors (OECD 2024, Chp. 3). Therefore, *reskilling and upskilling* needed in the context of green transformation may lead gender inequalities to persist, but may also be an opportunity to break them down.

In this context, *investing in the care sector* (education, human health and social work activities) is considered crucial in terms of reducing women's household burden, increasing women's employment, and strengthening a holistic sustainability approach (OECD, 2024; Terkoğlu-İzdeş, 2024). Thus, it provides an opportunity to "*transform gender norms by recognizing, reducing, and redistributing care work*" (Terkoğlu-İzdeş, 2024). Simulations of Türkiye's green transformation also show that while the care sector is the least polluting, supply falls short of the growing demand in child and elderly care; where to meet international standards, "…*Türkiye needs to provide early childcare and education services to an additional 5.8 million children and address a shortage of 303,000 personnel in health and long-term care services*" (Terkoğlu-İzdeş, *ibid*).

Terkoğlu-İzdeş (2024) also emphasizes the need for Türkiye to adopt/develop more robust and actionable strategies to bridge the gap between policy rhetoric and practice. She argues that while the policy documents utilize the European Commission's just transition narrative, they *fall short of including specific measures, targets, action plans, monitoring mechanisms, and the necessary resources to effectively address gender equality*. In other words, the actionable plans do not fully align with the EU's gender equality objectives.

In parallel with global simulations, the energy, agriculture, forestry and fisheries, and construction sectors are expected to be key drivers of green transformation in Türkiye. Apart from the care sector, *green jobs in the rural economy* can offer a wide range of employment opportunities for women arising from sustainable practices such as climate-smart agriculture, agroforestry, and organic farming. In this way, it is argued that women's conditions of unpaid work in agriculture as informal or household labor could be altered more effectively.

Beyond sectoral investments, Terkoğlu-İzdeş (2024) recommends that "*institutional capacity for development of gender egalitarian and inclusive policies, collecting gender disaggregated data, including gender aware experts in the data collection and monitoring process, continuous monitoring of concrete progress, sustained spending for inclusive*

and just transition, enabling access to green finance and technology of LMICs, development of a Global Fund for Women, and integrating gender budgeting to the green policies"

4.2. Greening the Labor Markets

Green transition requires a shift from investment in fossil fuels to cleaner sectors where the typical motto "*leaving no one behind"* has been popularized. However, to satisfy the preconditions of this well-celebrated motto, it ought to be first and foremost priority to understand the structural bottlenecks that hinder the creation and expansion of decent jobs in the formal economy. Accordingly, prevailing constraints on *formal and decent jobs* are among the main issues for just transition and reducing inequalities. In Türkiye, as an example, the share of informal employment in total employment reached 28.1% in 2022 (OECD 2024). It is also noteworthy that ILO transition simulations project that while more *formal jobs are generated for Turkish-citizen men* who are typically medium-skilled, more *informal jobs are generated for irregular refugees under temporary protection with low- or medium-skilled* (UNDP and ILO 2022). This further deepens the existing inequality among workers and makes them more vulnerable to employers.

UNDP and ILO (2022) simulations show that green development in Türkiye generates 300.000 extra jobs in the long term compared to the reference pathway. Analyzing 66 sectors in detail, the model shows that *only three industries will experience net losses by 2030*, with the majority of job losses to be observed in the traditional (fossil fuel) power industry (UNDP and ILO 2022). The employment effects of green transition under various scenarios are also studied at length via an input-output analysis by Gözkün and Orhangazi (2024, background paper). Özkün & Orhangazi's findings show that increased renewable energy investments generate more employment through their lifetime via the creation of higher maintenance jobs as compared to fossil fuels. Under a green development strategy differentiated in its ambition as expansionary versus conservative industry scenarios, the authors find that a net 17,417 to 94,424 more jobs could be created, respectively, in comparison to the business-as-usual scenario; with an annual increase of 0.02% in total employment to be generated under the green development trajectories.

In this context, UNU-WIDER (2023) proposes the following policies to reduce inequality in low- and middle-income countries: *"reducing economic inequality in the labour market, which can be achieved through more inclusive labour markets and economic development; and reducing post-market inequality, which can be achieved through social transfers and the provision of critical public goods such as health, education, transport and transit infrastructure."* (OECD 2024: 82). Additionally, the OECD Development Cooperation Report 2024 (preface, p.3) suggests the following policy actions targeted to ensure that green finance optimizes its contribution to sustainable development:

- *"Boosting the effectiveness of available financing by better integrating poverty reduction and climate in programme design and evaluation;*
- *Building capacity in developing countries' tax systems to enhance domestic resource mobilization;*
- *Expanding skills development opportunities for women to increase their participation in labor markets and their ability to participate in and benefit from the green transformation; and,*
- *Fostering inclusive labor markets and decent work conditions by supporting labor formalization and collective bargaining rights"*

4.3. Energy Poverty

The term *energy poverty*, was coined in the 2010 meetings of the World Economic Forum , as *the lack of access to sustainable modern energy services and products*.[13] In Isidaze and Altan's (2023) assessment, it is defined formally as "*a household's expenditure on fuel exceed[ing] more than 10% of its income*".
In the Turkish context, the Chamber of Electrical Engineers follow the data on household electricity usage closely, and their findings are displayed in Table 2.

Table 2. Household Electricity Usage Support Program, 2019-2023

	2019	2020	2021	2022	2023
No of Households Receiving Electricity Usage Support	1,343,109	1,659,448	1,801,835	2,719,745	4,378,839
No of People Covered	4,499,415	476,178	5,819,927	8,621,591	13,749,554
No of People Living in Poor Households (*)	17,207,000	17,921,000	17,636,000	18,030,000	18,219,000
Share of Poor People Receiving Electricity Usage Support (%) (*)	26.1	30.5	33.0	47.0	75.4
Total Electricity Support to Households (Bill TL)	0.686	1.25	1.57	4.72	8.67
(*) Poor Households as Defined by Turkstat					
Source: TMMOB, Chamber of Mechanical Engineers (2024) *Türkiyenin Enerji Görünümü Raporu*					

We observe that while the number of low-income households receiving electricity assistance has been increasing year by year, this increase peaked in the election year of 2023 with a 61% rise, reaching a total of 4,378,839 households. This indicates that electricity assistance reached 75% for those classified as "*poor,*" based on a poverty line determined as 60% of the equivalent household disposable income median.

It should be noted that representatives of the private sector generally advocate for supporting the poor *not through price subsidies, but with social assistance funded through public resources*, and favor energy aid. The specific aim of electricity distribution companies in supporting public-funded electricity aid for low-income households is motivated mainly by their interest in recovering unpaid bills and reduce illegal usage. It is expected that such social assistance would not only help solve the issue of unpaid bills for companies but also address the chronic problem of illegal electricity usage. In a sense, as the energy sector moves toward privatization, preventing electricity theft and recovering unpaid bills are effectively being "nationalized" through consumption support provided to low-income households using public resources (TMMOB, 2024).

5. Financing Green Transition

Based on current policy debates and the recent analytical literature surrounding economics of climate change, one can argue that pathways to a net zero emission for Türkiye, as well as the global economy, are relatively well-studied and understood; yet, in contrast, *financing of this transition,* and the *potential role of the financial sector* at large, is a relatively neglected area in the design of the green policy infrastructure. This gap is highlighted, for instance, by the former Governor of the Bank of England, Mark

13 Habitat for Humanity Energy poverty: effects on development, society, and environment available at: https://www.habitat.org/emea/about/what-we-do/residential-energy-efficiency-households/energy-poverty

Carney, who shares the observation that the *"global financial system is funding global warming up to a 4°C increase through its operations"* (Carney, 2015; Guardian, 2019).

Furthermore, there is a clear need to elevate the current capacities of global financial markets to cover the investment costs of transitions towards a green development pathway. To this end, Carney (2021) remarks that the required level of expenditures to get net zero emissions in line with the 1.5-degree target is projected to range from $100-150 trillion throughout the next thirty years. Emerging and developing countries will require two-thirds of the overall expenditure, making their requirement the most significant. Thereby, The International Energy Agency (IEA) emphasizes the need to double energy efficiency while indicating the necessity for *"very high new financial mechanisms"* to sustain the green transformation (IEA, 2023). As UNCTAD's call for The *New Collective Quantified Goal* towards Climate Finance suggests that developing countries require around $1.1 trillion for climate finance from 2025, rising to around $1.8 trillion by 2030.

Moreover, within the framework of *financially dependent globalization*, the imperative to perpetually furnish global financial capital with an unequivocal agenda of "structural reforms" has ultimately depleted states' capacity to establish and maintain traditional methods of acquiring and transferring economic surplus to the local rent-seekers (Orhangazi & Yeldan, 2023a). The institutional mechanisms established by technocratic elites in pursuit of an endless flow of structural reforms along the so-called dictates of market discipline have facilitated democratic regression, while simultaneously fostering the emergence of new institutions in a de-risking environment (Gabor, 2020). This confines not only Turkey but also most of the developing world to a set of restrictive structural limitations, obstructing their indigenous efforts toward sustainable, environmentally friendly and equitable growth.

The combination of these observations led Daniela Gabor (2020) and Dafermos *et.al* (2021) to coin the term "*Wall Street Consensus*". In their argument, Gabor and her colleagues argued that the primary climate policy tools of the current global financial architecture, which include debt-financed climate infrastructure assets, carbon pricing through international climate markets, and alignment with global financial investors to address the "infrastructure investment gap," will only increase the financial vulnerability of developing countries, and produce minimal or no progress toward achieving a path that leads to successful sustainable development.

Therefore, the significance of the financial sector in the green transformation manifests in two aspects: first, *redesign of the financial sector* in line with the green transformation; second, the *development of financial system products* to generate the necessary financial resources for the green transitions. The claim that more green finance is needed to address the climate crisis in an effective manner is clear on its own right. There are many critical voices, however, that challenge this idea and its implications, arguing that an emphasis on expanding financial resources as a fundamental approach to climate action is ultimayely constrained by the logic of global finance capital to accommodate speculation-driven growth models of accumulation and subjugation (Alami et al., 2023; Newell, 2021). It should be noted that "*green finance has emerged within the historical evolution of global finance and its contradictory governance in the global political economy*" (Sharma & Babic, 2025), and thereby a shift of regulatory focus is essential in dealing with the *ascendancy of finance against industry* (to recall a classic term by UNCTAD (1998), in the age of *hyper-financialization*.

The *first* step ought to be a revitalizing of the *fiscal space and its instruments*. Fiscal policy will need to be re-balanced in favor of a low-carbon economic structure, where not only fiscal expansion but also a *re-orientation away from fossil fuel-based activities* to decarbonization. This should entail *removal of direct and implicit subsidization* of the fossil economy, in particular coal.

A *paradigm shift in monetary policy* must be an indispensable component of the new strategy. The neoliberal dogma of *passive monetary policy of inflation targeting regimes* that had *de facto* transformed the indigenous central banks of the developing world to merely play the role of an accounting agency of global finance capital has to be abandoned.

Especially under the post-Covid transitions, *central banks will have to shift towards a more active policy stance* that is more engaged with elimination of structural bottlenecks rather than market neutrality in their pursuit of price stability along with esoteric communication languages.

As argued in the preceding pages of this Report, Türkiye is a prime example of the above-mentioned *whims and capricés of speculative finance*, as the country has yet to realize the necessary decoupling between growth and carbon reductions. Yeldan (2023) summarizes the dilemmas of Türkiye's green transformation efforts succinctly, as follows:

"*Türkiye offers very strong potential in renewables-led power generation given its geographical opportunities and wide array of potential gains from decarbonization of its industrial production. In contrast to all of this, however, Türkiye's macroeconomic outlook exhibits the characteristics of a typical late-industrializer, developing market economy trapped within the constraints of its growing population and speculation-driven patterns of growth. The country's overall ambitious targets on green industrialization are marred by short-termism and rentier characteristics of its investment patterns, with a heavy reliance on (imported) fossil-fuel based production and consumption patterns which, in turn, have limited domestic substitution possibilities. These pathways are often driven by extreme cyclical fluctuations in the rate of growth of the economy. Conditioned by an over-zealous quest for short term profitability and rent-seeking, the main outcomes have been a fragmented labor market along with dualities and widespread gaps in resource allocation and intensified foreign dependence on energy resources. All of these have hindered the transition towards a sustained and egalitarian green economy.*"

This would suggest that a viable green industrialization strategy based on green finance should include the following key elements:

- Shifting from fossil fuel-based production to sustainable and renewable forms of energy, industry, and agriculture.
- Tackling the informalization and fragmentation of labor markets and implementing programs to create decent jobs.
- Addressing wide disparities in incomes and opportunities, not only in terms of wage labor and capital or regional disparities, but also in terms of gender, ethnicity, and all forms of social exclusion.

- Giving the state a realistic role in mobilizing and allocating resources based on true social costs of natural resources, rather than relying solely on the expectations of oligopolistic markets.

As for the specifics of the design of a *national ETS*, Türkiye's new NDC should aim for "absolute reduction" for 2030. According to Climate Action Tracker projections, for instance, this will mean that, to be compatible with 1.5 degrees, Türkiye ought to restrict her total emissions to 433.9 million. Furthermore, the criteria for selecting facilities in the IRD and domestic ETS regulations should be aligned with the international standards and experiences. According to Aşıcı (2023), these call for the following:

- The pilot period (free allocation) should be shortened.
- Free allocations should be based on "sectoral benchmark criteria" (reference value), not on historical activity.
- National ETS should be widely implemented in the logistics sector, which is also an important emissions source.
- A portion of the ETS transactions income to be earned should be allocated to combating energy poverty.

6. Conclusions and Key Policy Messages

Green transition and the quest for a new industrial policy are by no means buzz-words for the Global South and not for Türkiye, in particular. Indeed, a number of critical developments in the global economy along with advances in empirics-driven policy work, further enabled the understanding of the need for *green industrial development policy strategies*. Even though the subject matter is subject to substantive differences of opinion and suffers overall from the lack of a commonly agreed definition, its main elements are nevertheless clearly understood: (1) increased concern for the environment, especially adaptation to and mitigation of the climate crisis via sustained pathways of decarbonized growth; (2) increased awareness of deepened polarization, social exclusion, and fragmented income strata; (3) appreciation of a more holistic approach towards a more inclusive development strategy that is capable of leveraging synergies arising from interlinkages between strategic sectors, *viz*. industry and agriculture; (4) raising awareness of the importance of accommodative institutions and the strategic role of the state in combatting the climate crisis. OECD (2014), for instance, in a detailed assessment of the future of the global economy, emphasizes that two essential reasons for its bleak prognostications rest with (i) *duality and unevenness of income distribution* in both a functional and regional sense and a consequent rise of social exclusion and conflict, and (ii) *environmental degradation* due to the threat of climate change.

Finally, given these premises, we propose the following policy actions for Türkiye towards attaining decarbonization in the medium to longer runs:

- Carbon must be realistically priced so as to reflect its true social costs. Offsets and various other international mechanisms that lead to exceptions should be kept at a minimum and must be dissolved within a pre-announced time frame.
- Transitioning away from coal ought to be regarded as an indispensable component of the overall policy package to attain the *Net Zero Emissions pathway*. Any energy and power sector that continues to rely on coal and fossil fuels will result in an astronomical price tag for CO2 and will prove the NZE pathway unrealistic.

- It is pertinent that certain *strategic* sectors, such as iron & steel, cement, transportation will need to be supported via exceptional treatments through tax breaks, compensations, free allowances, etc. Yet this must be announced under a *transitory* period and must be phased out in a transparent manner.
- It should be recognized that all along a decarbonization pathway based on pricing and restricting carbon emissions, there will be unavoidable costs in the short- to medium run. It must be understood that gains stand to be realized over a longer run and will not materialize immediately in miraculous fashion. Throughout this process, states will need to intervene simultaneously as an *administrator of social policy*, as a *regulator*, and as an *investor*.
- The fight against climate change should be prevented from being turned into an arena for financial speculation and rent-seeking.

References

Acar, S., Challe, S., Christopoulos, S. and Christo, G. (2018). “Fossil fuel subsidies as a lose-lose: Fiscal and environmental burdens in Türkiye”, New Perspectives on Türkiye, 58: 93-124. doi:10.1017/npt.2018.7

Acar, S. and A. Erinç Yeldan (2018) “Environmental Impacts of Coal Subsidies in Türkiye: A General Equilibrium Analysis”, Energy Policy, 90: 1-15.

African Climate Foundation and LSE (2023) Implications for African Countries of a Carbon Border Adjustment Mechanism in the EU. https://www.lse.ac.uk/africa/assets/Documents/AFC-and-LSE-Report-Implications-for-Africa-of-a-CBAM-in-the-EU.pdf (August 14, 2024).

Alami Ilias, Carolina Alves, Bruno Bonizzi, Annina Kaltenbrunner, Kai Koddenbrock, Ingrid Kvangraven & Jeff Powell (2023) “International financial subordination: a critical research agenda”, Review of International Political Economy, 30(4): 1360-1386,

DOI: 10.1080/09692290.2022.2098359

Dafermos, Yannis, Daniela Gabor & Jo Michell (2021) The Wall Street Consensus In Pandemic Times: What Does It Mean For Climate-Aligned Development?, Canadian Journal of Development Studies / Revue canadienne d'études du développement, 42:1-2, 238-251.

Gabor, Daniela. 2020. “The Wall Street Consensus.” SocArxiv PapersJuly. Available at: https://osf.io/preprints/socarxiv/wab8m/

Gözkün, Kübra Atik & Özgür Orhangazi (2024) “Growth, employment, and current account consequences of transition to solar and wind power in Türkiye: An input-output analysis” Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

Grabel, Ilene (1995) “Speculation-Led Economic Development: A Post-Keynesian Interpretation of Financial Liberalization Programmes in The Third World” International Review of Applied Economics 9(2): 127-149, 1995.

Intergovernmental Panel on Climate Change (IPCC) (2018) Global Warming of 1.50C.

Kat, Bora (2024) “De-Carbonizing the Turkish Power Sector” Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

Karakoç, Ulaş & A Erinç Yeldan (2024) “Role of Agriculture in Green Transition in Türkiye” Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

Ministry of Energy and Natural Resources (MoENR) (2022). Türkiye National Energy Action Plan. https://enerji.gov.tr/Media/Dizin/EIGM/tr/Raporlar/TUEP/Türkiye_National_Energy_Plan.pdf

Ministry of Energy and Natural Resources (MoENR) (2024). National Energy Balance Tables. https://enerji.gov.tr/eigm-raporlari

Newell, P (2021) Power Shift: The Global Political Economy of Energy Transitions UK: Cambridge University Press.

OECD (2024), Development Co-operation Report 2024: Tackling Poverty and Inequalities through the Green Transition, OECD Publishing, Paris, https://doi.org/10.1787/357b63f7-en.

Orhangazi, Özgür (2020) Türkiye Ekonomisinin Yapısı, İmge Yay.

Orhangazi, Özgür and A. Erinç Yeldan (2021) “Re-Making of the Turkish Economic Crisis” Development and Change, May, 52(3), pp 460-503.

Orhangazi, Özgür & A. Erinç Yeldan (2023a) “Türkiye in Turbulence: Heterodoxy or a New Chapter in Neoliberal Peripheral Development?” Development and Change, in press.

Orhangazi, Özgür & A. Erinç Yeldan (2023b) “Türkiye: Challenges and Strategies Towards Sustainable Development”, Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

SEFIA (2024) Türkiye’de Kömüeden Çıkışın Finansmanı, Ankara.

Şahin, Ümit (2016) “Warming A Frozen Policy: Challenges To Türkiye’s Climate Politics After Paris”, Turkish Policy Quarterly, 15(2): 117-130.

Şahin, Ü., Tör, O. B., Kat, B., Teimourzadeh, S., Demirkol, K., Künar, A., Voyvoda, E., & Yeldan, E. (2021). Decarbonization Pathway for Türkiye: Net Zero in 2050.

Sharma, Sarah & Milan Babic (2025) “Introduction: The international political economy of green finance” Competition and Change, in print. DOI: 10.1177/10245294241310546

Taymaz, Erol (2024) “Industrial Development and Green Transformation: Prospects for Türkiye” Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

Taylor, Lance (2004) “Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream” New York and London: Harvard University Press.

Terkoğlu, Özge İzdeş (2024) “Gender Equality and Green Transformation in Türkiye” Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

TMMOB (Chamber of Mechanical Engineers) (2024) Türkiye’nin Enerji Görünümü, TMMOB: Ankara.

TUSIAD (2016) "Ekonomi Politikaları Perspektifinden İklim Değişikliğiyle Mücadele," TÜSİAD, İstanbul.

UNDP, and ILO (2022) Social and Employment Impacts of Climate Change and Green Economy Policies in Türkiye. https://www.ilo.org/publications/social-and-employment-impacts-climate-change-and-green-economy-policies

UNFCC (2024) Türkiye 2053 Long Term Climate Strategy https://unfccc.int/sites/default/files/resource/Turkiye_Long_Term_Climate_Strategy.pdf

United Nations (2020) Extreme Poverty and Human Rights. https://documents.un.org/doc/undoc/gen/n20/259/03/pdf/n2025903.pdf

United Nations (2013) Millennium Development Goals Report, https://www.un.org/millenniumgoals/pdf/report-2013/mdg-report-2013-english.pdf

United Nations Conference on Trade and Development (UNCTAD) (2021) Trade and Development Report, 2021, Geneva.

-- (2019) Trade and Development Report, 2019, Geneva.

-- (2016) Trade and Development Report, 2016, Geneva.

-- (1998) Trade and Development Report, 1998, Geneva.

United Nations Environment Program (UNEP) (2019) Emissions Gap Report 2019. Geneva.

UNU-WIDER. 2023. Towards Peace, Decent Work, and Greater Equality: Research Evidence for Transforming Economies, States, and Societies. Helsinki. https://www.wider.unu.edu/publication/towards-peace-decent-work-and-greater-equality (August 14, 2024).

Voyvoda, Ebru and A. Erinç Yeldan (2015) Greening Turkish Economy: A General Equilibrium Investigation of Environmental Policies for A Low Carbon Growth Path" Report prepared for the Istanbul Policies Center and World Wild Foundation (WWF-Türkiye).

http://ipc.sabanciuniv.edu/en/wp-content/uploads/2015/11/Low-Carbon-Report1.pdf

World Bank (2016) INDC Content Briefs: Türkiye, 2016. http://spappssecext.worldbank.org/sites/indc/PDF_Library/TR.pdf

World Bank (2022) The Country Climate and Development Report, Türkiye. Washington DC.

WWF Türkiye, SEFİA, CAN Europe, and Adhoc. 2023. Adana Tufanbeyli Enerji Geçişinde Sosyal Kırılganlık Analizi.

Yeldan, A. Erinç (2024) "Role of Finance in Türkiye's Green Transition: Investigating for Opportunities under Current Trends and Path Dependence" Country Report prepared for the Project, Integrated Policy Strategies and Regional Policy Coordination for Resilient, Green and Transformative Development, UNCTAD, Geneva.

Yeldan, A. Erinç (2023) "Türkiye: Challenges and Strategies Towards De-Carbonization and Sustainable Development Under the Age of Finance", Japanese Political Economy, 49(2-3): 183-211. https://doi.org/10.1080/2329194X.2023.2259948