Turkey: Challenges and Strategies Towards De-Carbonization and Sustainable Development Under the Age of Finance

A. Erinç Yeldan
Department of Economics
Kadir Has University
erinc.yeldan@khas.edu.tr
ORCID: 0000-0002-3123-4374
Twitter @ErincYeldan

Version 2.0
August 2023

I am indebted to Özgür Orhangazi, Gül Ünal, and Burcu Ünüvar and to participants of the Kadir Has – UNCTAD workshop on Green Development (May 2022) for their valuable comments and suggestions on earlier versions of this study. All caveats do apply.

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ABSTRACT

The aim of this paper is to present the key challenges and structural constraints as well as potential strategies towards de-carbonization and green transformation for Turkey; and to argue that the current mode of global finance operates, in many ways, to constrain her quest for a sustainable and green industrial policy. I cast Turkey's conundrum onto her speculation-led growth patterns and the ongoing fossil fuel-based production cycle; and highlight the trade-offs and dilemmas of the pursuit of green abatement policies, given the logic of financialization.

Key words: *de-carbonization, speculation-led growth, climate crisis, net zero emission targets, Turkey*

I. Introduction

The ecological and climate crisis are deepening despite efforts and rhetoric on immediate action. A recent Report by the IPCC, for instance, cautions that global warming is *likely* to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (IPCC, 2019). The Report reveals 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 IPCC researchers warn against failing to meet this task, where the ongoing trends would exacerbate extreme weather events, rising sea levels and diminishing Arctic Sea ice, coral bleaching, and loss of biodiversity, among other impacts. In what follows, IPBES warns in its 2019 Report that "*one million of the eight million species on the planet are at risk of being lost; forests and oceans are being polluted and destroyed*".

All these call for effective responses to climate change together with a global collective effort, and yet challenges abound. The global effort to combat climate change is severely hampered by the long-ignored differences between the developed and developing countries concerning the ecological, economic, and political threats they confront in the face of a global climate crisis and the potential solutions that can address these diverse challenges. Accordingly, UNCTAD's *Trade and Development Report 2019*, rightly argues that "*global economy does not serve all people equally. Under the current configuration of policies, rules, market dynamics and corporate power, economic gaps are likely to increase and environmental degradation intensify*".

Even though climate change is definitely a *planetary-problem*, its effects are not symmetric across the global economy. Accordingly, International Labor Organization (ILO, 2019) reports that global loss in employment due to declines in productivity from heat stress had been on the order of 35 million full time jobs in 1995 with a loss of US$ 280 billion of global output. By 2030 such losses are projected to reach 280 million lost jobs with a total loss of 2.5 trillion dollars of global income (ILO, 2019). Yet, the burden of such losses is disproportionally shared by the L&MICs. Accordingly, ILO underlines that as of 1995 loss in gross income has been 2.8% in L&MICs, while it was only 0.1% of the potential GDP in the high-income countries (HICs). By 2030, such losses are projected to rise to 4.4% for the L&MICs, while they are expected to stay around at 1% in HICs.

Furthermore, a recent report by OXFAM (2021) further reveals that per capita greenhouse gas (CO2e) emissions of the richest 1% in the world increased by 25% compared to 1990, and by 2030 they will reach a level 30-folds of the 1.5^0C target. On the other hand, emissions created by the "global poor" –the bottom 50% will be 20% below the average, observations for which Parsons (2021) coined the term, *carbon colonialism*.

Against this background, the UNCTAD 2019 report recasts the Depression Era's experiences on a global scale –under a Global Green New Deal (GND); and offers it as the right policy framework, "*to make a clean break with years of austerity and insecurity following the global financial crisis, help bring about a more equal distribution of income and reverse decades of environmental degradation*". On a broader scale, the green new deal also entails a call for a *new industrial policy* together with "*designing institutional frameworks that counter both informational and political risks*" (Rodrik, 2015). Chomsky and Pollin (2020) further argue that fear of so-called economic disaster and unemployment arising from the transition to a green economy is mis-placed, and is only a by-product of biased attitudes favoring fossil fuel-led growth fetishism.

Indeed, this new geopolitical approach seem to have introduced new opportunities and challenges for addressing the global climate crisis. While such a global climate project may potentially make implementation and accountability easier for the global economy and, thus, expedite the global green turn; there are growing concerns over the potential drawbacks arising from the adverse implications of this new policy framework on the ecological and economic policy trajectories of the developing countries.

To begin with, the ambitious targets of GND are cast within the shadowy realm of the *age of anxiety* where, led by the hyper-globalization episodes of premature financial deregulation especially within the developing world, the global economy is excessively financialized and

fragile; global demand remains weak; investment is sluggish; and distribution of incomes and wealth is heavily concentrated. Invigorated by the collapse of the Bretton Woods system and the elimination of the gold standard against the US dollar, this new financial order had been working under the conditions of almost *no rule of gravity* where the *objective value* of money is exclusively left to the *caprices* of the *speculative arbitrageurs*. In this setting, finance has successfully expanded its rationale on the global labor and commodity markets, destroying localities and all regulations that remain on its way to inhibit the logic of free market mobility (UNCTAD, 2016). In fact, in the words of UNCTAD (2019), "*most of the current industrialization and governance problems originate from the excessive volatility of speculative finance flows characterizing the current realm of markets*".

The likely adverse impacts of premature and lopsided financialization on environmental abatement can be argued to operate through many channels. The first one refers to what we might call *the time horizon mismatch*. In an attempt not to miss the arbitrage opportunities, the time horizon of financial arbitrageurs is extremely short; and thus, the *tick-nature* of financial operations makes it pertinent that economic decisions ought to be unavoidably quick and almost automated. Translated over to the realm of the *real sectors* of the economy, this often causes short-sightedness and mis-allocation of resources (Stiglitz, 2000) (see also Diaz-Alejandro, 1985, for the original statement of the problem).

Secondly, financialization has often been seen concomitant with the rise of concentration of power and oligopolization of the global asset and commodity markets (a recent narration is provided by two IMF economists, Diez & Leigh, 2018). Narrating Diez and Leigh, "*in advanced economies, rising corporate market power has been blamed for low investment despite rising corporate profits, declining business dynamism, weak productivity, and a falling share of income paid to workers.*" Third, and related with this, the post-1980 financial globalization has witnessed a worsening of income distribution (see Piketty 2013, narrating the most popular version of this episode along with Milanovic 2012), together with a secular stagnation of real wage remunerations, and falling wage share (OECD, 2014). In turn, as highlighted in OXFAM (2021), worsening income positions of the middle-income strata often lead to over-utilization and buildup of excessive pressure over environmental resources.

Last, but not least, cut-throat competition in the financial sector has led the global asset markets to generate excessive credit and debt over-accumulation. Popular narrations of this debt-overhang underscore the fact that global debt stock has surpassed US$260 trillion (3.5-folds of global gross income). Lure of the ongoing financial instrumentalization leads to over-consumption, over-stretching of global resources, and intensified ecological footprint.

These observations taken together led Daniela Gabor (2020) to coin the term *Wall Street Consensus*, who along with her colleagues argued that its key climate policy tools –carbon pricing via international climate markets, debt-driven climate infrastructure asset instruments, and co-alignment with global financial investors to close the "infrastructure investment gap"—will serve only for intensified financial vulnerability in the Global South, and lead to little achievement, if any, towards hopes of a green development pathway. (Dafermos, Gabor and Michell (2021). One of the main elements of this alleged transition, in fact, is the imposition of the so-called emissions trading system (ETS) over to the shallow asset markets of the developing world –a strategy which in the words of Lohman (2011), is nothing but "*one of many neoliberal innovations of recent times* … (to serve as an) *imperative for surplus capital to find new outlets at a time of declining profits, and the continued global political dominance of the US*" (p.94).

The constraining whims of speculative finance are vehemently observable for Turkey, where the warranted *de-coupling* between growth and emission reductions is yet far from realization. As of 2021, Turkey's per capita emissions of carbon dioxide (CO_2) and other greenhouse gasses (CO_2 eq.) stand at around 6 tons, while its total CO_2 eq. emissions per $GDP (in constant USD) reach to 0.524 kg.[1] In addition to this adverse performance indicators, Turkey is further cited among the top three countries that disclose the fastest rate of growth of per capita gaseous emissions (Orhangazi & Yeldan, 2023c). Turkey's CO_2 eq. emissions increased from 214 million tons in 1990, to 564 million tons in 2021 (recording a cumulative increase of 156.9 %). Projections by the *Swedish EcoEquity Institute* suggest that total CO2 emissions will reach to 680 million tons by 2030 under a scenario of "low commitment". In fact, one of the main criticisms of Turkey's climate abatement pathway is that it does not yet admit any fall in absolute emissions, but is only tailored in terms of declines *relative* to a hypothetical base path –which itself is severely criticized due to its exaggerated and dubious assumptions.[2] This suggests that Turkey will be on a divergent trend against many of the emerging market developing economies, as well as the world averages over the next decades.

Instruments of environmental policy in Turkey thus far consisted mainly of excise taxes on energy consumption without much concern towards earmarking for environmental abatement. However, it is now a well-documented observation that price instruments, administered through the market alone, will not suffice to achieve the broad objectives of controlling global GHG concentrations, nor maintaining a sustainable and eco-friendly growth path (Acar, Challe,

[1] 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
[2] See, *e.g.*, Voyvoda & Yeldan, 2016; Acar & Yeldan, 2018.

Christopoulos and Christo, 2014). Part of the problem is due to the failure of the impatient market optimizers to capture the positive spillovers associated with long term technological change driven by renewables. At the root of these problems are market failures due to mis-matches of the time horizon, where (private) gains are imminent and yet (social) costs are part of the long durée.

In this study, my aim is to present the key challenges and structural constraints as well as policy strategies for Turkey towards its potential green transformation. The next section starts with a brief review of the recent macroeconomic developments under her specific history of financialization and rent seeking-driven patterns of growth and continues in Section 3 with an analytical overview of the energy sector and energy policies. The specifics of Turkey's climate policies under these turbulent pathways are discussed more formally in section 4. Section 5 summarizes and concludes.

II. Turkey, post 2001 Crisis: Macroeconomics of Financialization

In this section, I provide a brief overview of Turkey's financial integration to the global economy and evaluate its economic policy choices along with their implications for growth, stability, and crisis dynamics. Following its trade and financial liberalization in the early 1980s, Turkey removed the remaining set of capital controls in 1989. This transformation gave way to deep fluctuations and resulted in boom-bust cycles where pathways of national output are ultimately conditioned by the speculative caprices of financial arbitrageurs. Thereby, the course of domestic economic activity has been set by capital flows, especially short-term speculative finance. Rapid capital inflows and economic growth were followed by outflows and crises, much like the experiences of many developing economies of Latin America in the aftermath of their episodes of liberalization of the capital flows (Orhangazi & Yeldan, 2023a, Boratav, *et.al*, 2002, Cizre-Sakallıoğlu & Yeldan, 2000).

This aforementioned experience which relied (and was constrained by) speculative hot money flows had been termed as *speculation-led growth*, a la Grabel (1995). Originally set its course mostly with the militarized episodes of neoliberal re-structuring of the late 1970s and 1980s, many Latin American –as well as the Turkish- economies had been trapped into an (imported) capital intensive, debt-ridden growth path with a fragmented industrial structure and a declining employment creation capacity.

What lied at the heart of this restructuring was the ascendancy of finance over industry, a global process of *financialization* subjecting its logic of short-termism, liquidity, flexibility, and immense

mobility over objectives of long term industrialization, sustainable development and poverty alleviation with social welfare driven states. *Financialization*, as it stands, is a loose term and yet a consensus definitely exists among economists on what it entails. Starting from David Harvey's seminal observation that "*something significant has changed in the way capitalism has been working since about 1970*" (Harvey, 1989: 192), a set of distinguishing characteristics of the concept are clearly unveiled. Krippner (2005: 174), in line with Arrighi's The *Long Twentieth Century* defines it as a pattern of accumulation in which profits accrue primarily through financial channels rather than through trade and commodity production. According to Epstein (2005: 3) "*financialization means the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of domestic and international economies*".

In what follows, in a broader way, we can consider financialization as a phenomenon which can be described by increasing financial motives, volume and impact of financial activities within and among countries. As Duménil and Lévy (2004) underline, "*what is at issue here, are not markets and states per se, but the stricter subjection of these institutions to capital: on the one hand, the freedom of capital to act along its own interests with little consideration for salaried workers and the large masses of the world population, and, on the other hand, a state dedicated to the enforcement of this new social order and the confrontation to other states.*"

The contours of this financially dependent mode of growth was succinctly described in a series of influential contributions by the structuralist school (see, *e.g.*, Diaz-Alejandro, 1985; Taylor, 1998). Depicted as the *Alejandro-Taylor cycle* in Yeldan (2022), the speculative discourse is typically set into motion by the significantly high rates of real interest as warranted by the foreign finance capital. An indigenous developing economy with typically a shallow financial market and lacking regulative powers on its capital account is constraint to this high rate of interest pathway due to the ongoing threat of capital out flight. Nevertheless, such a choice leads to rapid inflows from the global financial market, leading to pressures on the domestic currency to appreciate. As depicted in Figure 1 below, such appreciation unavoidably ends up with a widening current account deficit as well as foreign debt accumulation. In turn, to finance the widening external deficit the authorities often find themselves trapped to the high interest rate – appreciating currency modality to recommence the cycle.

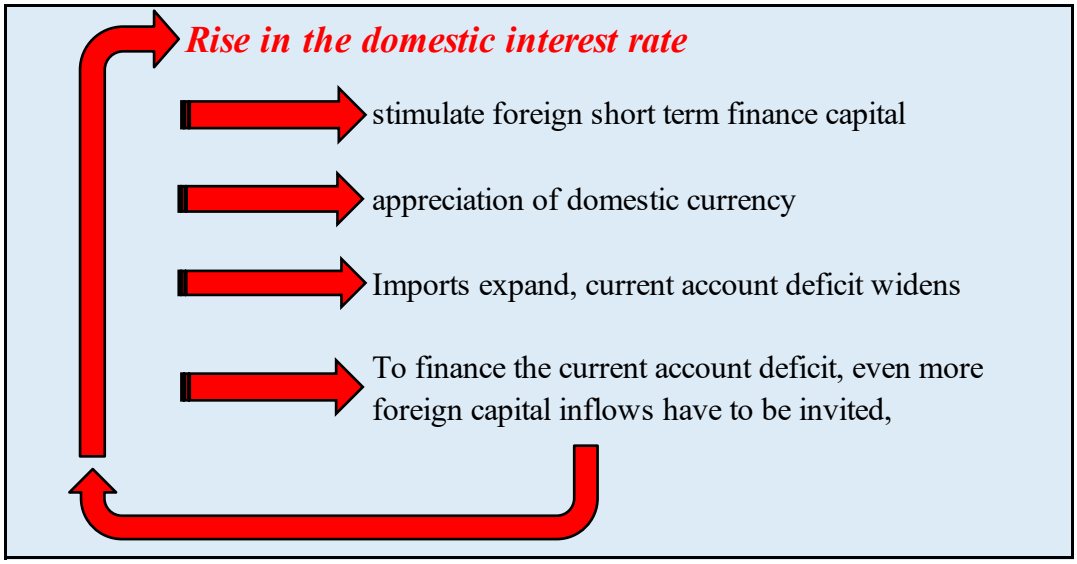


Figure 1. The Alejandro-Taylor Cycle: Vicious Circle of Capital Flows & Macroeconomic Disequilibria. Adapted from Yeldan (2022).

Following the severe crisis of 2001, Turkey shared many instances of the *Alejandro-Taylor cycle* as it chose to implement an orthodox strategy of raising interest rates and to maintain an "overvalued" exchange rate, all administered under unfettered mobility of finance capital. These economic and political adjustments were mainly overseen by the then newly founded Justice and Development Party (JDP) that came to power enjoying absolute majority in the parliament in the November 2002 elections. The JDP government further followed a *contractionary* fiscal stance and initiated a series of privatizations to be accompanied by so-called "market friendly" structural reforms under the direction of the IMF.[3]

It has been argued by quite many observers that the macroeconomic conjuncture that Turkey finds itself in today has its roots in the macroeconomic and policy environment of the previous two decades (*e.g.*, Orhangazi & Yeldan 2021, 2023a; Boratav & Orhangazi 2022; Apaydın and Çoban 2022; Akçay, 2021; Bedirhanoğlu, 2019). Accordingly, the invigorated capital inflows kept the real exchange rate at relatively overvalued levels and resulted in widening current account deficits with increasing dependency of consumption and production to imports. High current account deficits, increased external debt stock, and increasing domestic indebtedness

[3] See Akyüz and Boratav (2003), Boratav, Yeldan and Köse (2002), Yeldan (2002), Ertuğrul and Selcuk (2002), Cizre-Sakallıoğlu and Yeldan (2000), and Orhangazi (2020) for a thorough overview of the post-1990 Turkish macroeconomic history. Biçer and Yeldan (2003), Öniş and Aysan (2000), and Yentürk (1999) provide similar analyses based on the effects of international speculative financial capital flows on the Turkish economy. Somel (2003) and Yeldan (1995, 1998), in turn, discuss the characteristics of the post-1990 Turkish macro adjustments in terms of creation and absorption of the economic surplus, and provide a quantitative analysis on the strategic role played by the state apparatus.

created a series of fragilities while maintenance of growth depended on continued inflows of foreign capital. The speculation and debt-led characteristic of growth resulted in fragile balance sheets of both the banking sector as well as the enterprises, while the government's focus shifted towards a construction-centered growth strategy. All of these led to the invigoration of a premature deindustrialization tendency and put the economy on an unstable growth path characterized by insufficient employment generation and persistent inequalities (Orhangazi & Yeldan 2021, 2023a; 2023b, Yeldan, 2022).

Table 1 below summarizes the main parameters of this episode.

	Total foreign capital inflows (billion US$)	Ratio of For Capital to GDP (%)	Rate of Growth of GDP (%)	Ratio of Current Acc Bal to GDP	Unemployment Ratio	Inflation (CPI)	Inflation (PPI)	Central Bank Interest Rate	TL/US$ (CBRT effective purchase rate))	Real Exchange Rate (PPI-based)
2000	13.0	4.7%	7.0	-3.6%	6,5	39.0	32.7	60.0	0.6	110.9
2001	-12.7	-6.3%	-5.9	1.9%	8,4	68.5	88.6	60.0	1.2	89.0
2002	4.2	1.7%	6.4	-0.3%	10,3	29.7	30.8	55.0	1.5	94.2
2003	10.0	3.2%	6.0	-2.4%	10,5	18.4	13.9	43.0	1.5	99.2
2004	26.9	6.6%	9.5	-3.5%	10,8	9.3	13.8	38.0	1.4	100.7
2005	45.5	9.0%	9.1	-4.1%	10,6	7.7	4.54	23.0	1.3	112.1
2006	62.9	11.3%	7.0	-5.6%	10,2	9.7	11.58	27.0	1.4	103.5
2007	60.4	8.9%	5.1	-5.4%	9.2	8.4	5.94	25.0	1.3	115.3
2008	46.7	6.1%	0.7	-5.1%	10.0	10.1	8.11	25.0	1.3	102.4
2009	5.8	0.9%	-4.8	-1.7%	13.1	6.5	5.93	15.0	1.5	105.0
2010	65.8	8.5%	8.6	-5.7%	11.1	6.4	8.87	14.0	1.5	111.4
2011	53.8	6.4%	11.0	-8.9%	9.1	10.5	13.33	17.0	1.7	97.9
2012	72.7	8.3%	4.8	-5.4%	8.4	6.2	2.45	13.5	1.8	103.5
2013	67.7	7.1%	8.7	-5.8%	9.0	7.4	6.97	10.3	1.9	94.8
2014	52.2	5.6%	4.9	-4.0%	9.9	8.2	6.36	9.0	2.2	102.3
2015	30.6	3.5%	6.0	-3.1%	10.3	8.8	5.71	9.0	2.7	97.4
2016	28.3	3.3%	3.3	-3.1%	10.9	8.5	9.94	8.8	3.0	90.7
2017	48.2	5.6%	7.5	-4.7%	10.9	11.9	15.47	8.8	3.6	84.1
2018	5.4	0.7%	3.1	-2.6%	11.0	20.3	33.64	18.5	4.8	83.0
2019	19.3	2.5%	0.8	1.4%	13.7	11.8	7.36	12.8	5.7	82.1
2020	11.8	1.6%	1.8	-4.4%	13.1	14.6	25.15	15.8	7.0	73.8
2021	51.1	6.2%	11.6	-0.9%	12.0	36.1	79.89	14.8	8.9	66.5
2022	47.1	5.2%	5.4	-5.3%	10.4	64.3	97.72	9.8	16.6	89.9

Table 1: Turkey, Post-2000 Selected Economic Indicators
Sources: Central Bank of The Republic of Turkey (CBRT), TurkStat. Complemented by data in Orhangazi & Yeldan, 2023b.

Data in Table 1 disclose three subperiods, portioned by the intensity of foreign capital inflows. The first subperiod extends over 2002 to 2007 (from the post-2001 neoliberal restructuring to the eruption of the global financial crisis) and corresponds to the so-called *Era of Great Moderation*. Lured by the widening current account deficit financing of USA, this period meant an era of cheap foreign liquidity and historically low rates of interest. Turkey with her offerings of very high rate of interest arbitrage, invited foreign financial inflows, with the end results being severe appreciation of the domestic currency and widening current account deficits.

The second subperiod opens with the post 2008/09 global financial crisis episode of *quantitative easing* in the developed financial markets. This subperiod meant another round of foreign inflows for Turkey. Yet the era was also characterized by *great recession* of the global economy and meant increased volatilities and faltering exports for Turkey. Unemployment could not have been reduced and foreign gap widened. Finally, to this saga of events comes the third subperiod where increased instability has characterized the macroeconomic environment in Turkey since 2018. Even though the real GDP growth in 2021 reached 11 percent, this high growth came at the expense of sharp currency depreciation (around 40 percent in 2021), rapidly increasing inflation rates, and without much employment generation where the official open unemployment rate still hovers around 10 percent.[4]

All of this meant an increasingly capital-intensive technological pathway of the domestic economy. The secular rise of capital per unit of employment has, in fact, been an indispensable characteristic of the many emerging economies that have prematurely deregulated their capital account to integrate with the global financial markets. Measured in fixed TL prices, utilization of capital per worker employed has doubled from 1989 (completion of Turkey's capital account deregulation) to the eruption of the global financial crisis in 2008, from 4 thousand TL to 11,600; and then hovered around that rate for the remainder of the 2000s[5].

The implied pathway resulted in labor-shedding and a structurally persistent unemployment. As portrayed in Figure 2, the meager job creation had been a concomitant feature of the post 2001 neoliberal era where labor employed per 1 million TL real value added (in 2017 prices) was almost cut by half from 25 workers to less than 15 by 2022; and the rate of open unemployment could not have been brought below 10 percent over two decades. Thus, it has to be noted that the adverse effects of the debt-intensive mode of financing of the external deficits were not solely a matter of increased external fragility with the end result of "loss of confidence and credibility" for the financial arbitrageurs, but further meant a diversion of the indigenous

[4] https://www.tuik.gov.tr

[5] See Orhangazi & Yeldan (2021; 2023a) for further assessment and data sources.

development pathways away from labor intensive technologies towards increasingly capital intensive modes of production, financed by way of speculative hot money finance and external debt accumulation. All of this meant intensification of the import-dependence of the domestic industry and reduction of the domestic value-added content of output.

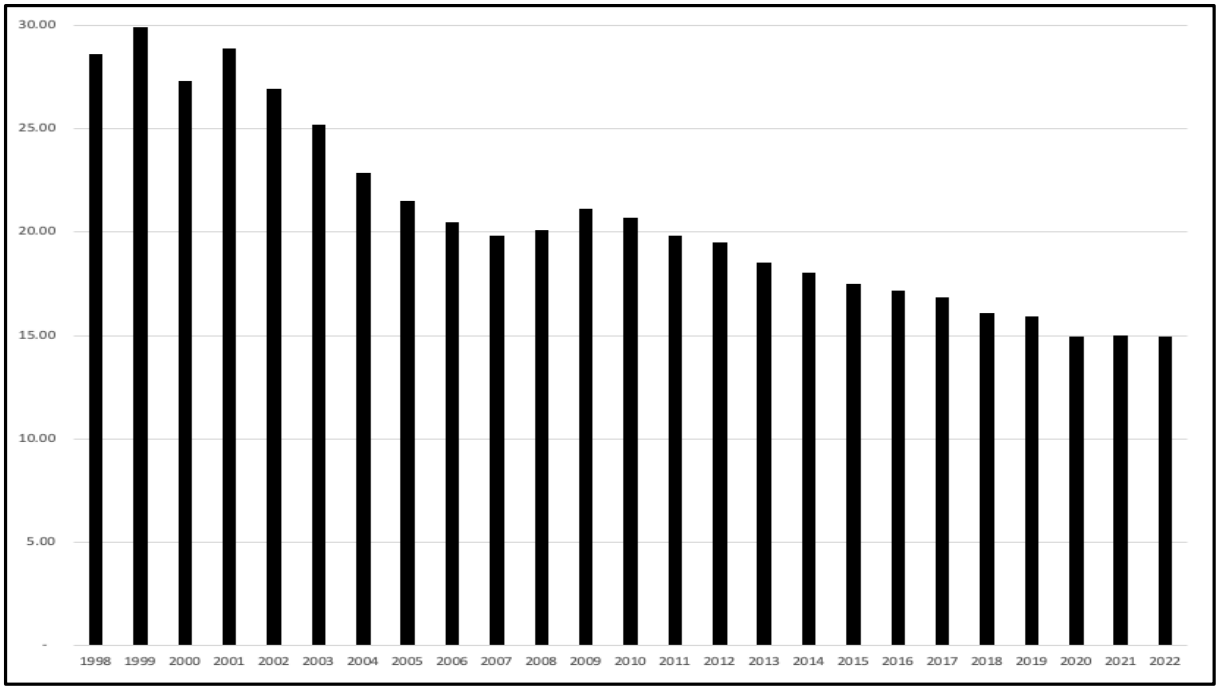


Figure 2: Labor intensity of gross value added (employment/real GDP), (persons/1,000,000TL)
Sources: Adapted from Orhangazi & Yeldan, 2023a, with authors' calculations based on Turkstat Household Labor Power and National Accounts Statistics.

We now turn to a discussion of the climate score card of Turkey given this macroeconomic structure.

III. Climate Abatement under Speculation-Led Growth

Turkey is attempting to pursue an indigenous industrialization strategy based on green growth and renewables acquisition. However, this is by no means a simple task. For one, as discussed above, the economy is severely constrained in sustaining its energy security and is severely hampered by the binding import dependence on crucial intermediate inputs and foreign technology.

All of this necessitate ready and continuous flow of foreign capital, which Turkey is not in a position to sustain through exports and other revenue sources such as tourism or remittances. Thus, while the Turkish economy is grappling with the challenges of ensuring a cost-competitive

energy supply for its industrialization ventures and ensuring energy security, its environmental indicators continue to erode. On the gaseous emissions account, the country admits a relatively low score, yet growth of *per capita emissions* is known to be one of the fastest among the OECD countries. Total greenhouse gaseous (GHG) emissions rose from 219.7 million tons in 1990 to 564 million tons in 2021, yielding a cumulative increase of 156%. Figure 3 below portrays the path of GHG emissions by sources of origin.

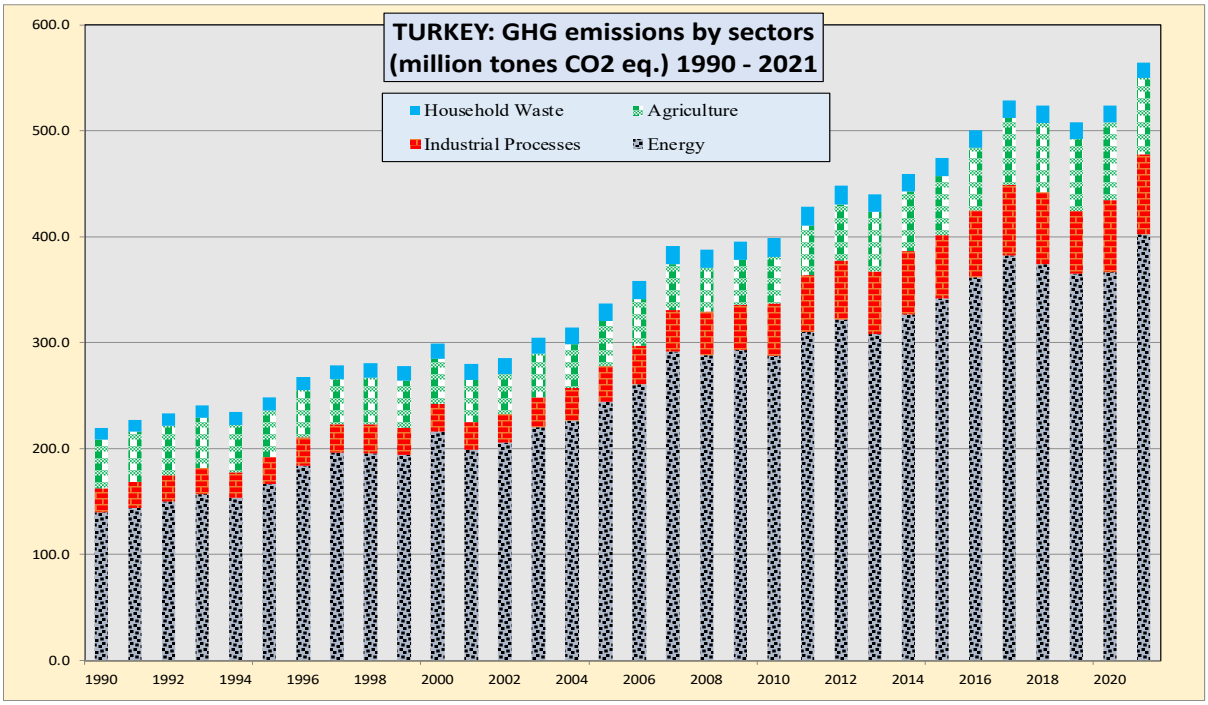


Figure 3: GHG emissions by sectors, 1990-2021
Source: Turkstat, Environmental statistics.

As observed the bulk of emissions originate from energy sector. Turkey's official strategy on energy security and industrialization rests, overall, on first depleting *domestic supplies* of coal, to be complemented by *nuclear power* which is being built under Russian technology and administration. Renewables, even though is generously subsidized, is still at its infancy and what's more troublesome, suffers from many clientelist rent seeking episodes of patronage among the bureaucracy and the favored conglomerations. The lion's share in public procurement is often dealt under clientelist maneuvers favoring rentiers and speculative arbitrageurs. This can be seen as a direct extension of the speculation-led patterns of growth and foreign finance as discussed in the above section.

III-1. Developments in The Energy Sector under the Neoliberal Era

To infer a bird's-eye-view of the energy economy, it would be best to study the general energy balances data. Table 2 summarizes the main components of the energy supply and demand flows across its sources and usage for 2002, 2020 and 2021 (the last available data at the time of writing).

				Share in Total (%)			Avg Annual Rate of Change (%)	
	2002	2010	2021	2002	2010	2021	2002-2010	2010-2021
Domestic Production	24,430	31,558	46,720	31.70	29.80	29.30	3.20	3.57
of which Coal	11,538	16,214	17,163	14.97	15.31	10.77	4.25	0.71
of which Renewables[1]	322	683	4,762	0.42	0.64	2.99	9.39	24.28
Imports	57,156	84,606	124,296	74.16	79.90	77.96	4.90	4.81
of which Coal	8,342	14,423	23,670	10.82	13.62	14.85	6.84	6.19
Exports (-)	3,162	7,991	9,012	4.10	7.55	5.65	11.59	1.50
Total Primary Energy Supply	77,075	105,888	159,432	100.00	100.00	100.00	3.97	5.12
Generation and Energy[2]	-17,590	-26,048	-35,573				4.91	3.90
Electricity Plants[2]	-11,580	-19,964	-30,566	100.00	100.00	100.00	6.81	5.32
of which Coal	-8,121	-13,037	-23,207	70.13	65.30	75.92	5.92	7.21
of which Renewables[1]	-4	-251	-3,902	0.04	1.26	12.77	51.33	34.31
Total Energy Consumption	59,486	79,840	123,859				3.68	5.49
Consumption of Industry	23,022	79,203	41,614	100.00	100.00	100.00	15.44	-8.04
of which Coal	8,693	8,641	10,739	37.76	10.91	25.81	-0.07	2.72
of which Renewables[1]	119	130	301	0.52	0.16	0.72	1.11	10.49
1. wind and solar								
2. Net of Petroleum and Electricity usage								

Table 2. Turkey, General Energy Balances (*'000 Toe*): 2002-2021
Source: TR Ministry of Energy and Natural Resources, General Energy Balances

General trends are as follows: over the 2000's, share of domestic production in total primary energy supply continued its downward trend (see Figure 4 below) while share of imports maintained its rising trend. Within domestic production of the primary energy supply, share of coal declined rapidly especially after 2010, and the share of renewables (wind and solar photovoltaics) accelerated reaching an annual expansion rate of 24.3%, albeit still constitute only 10% of domestic production (and 3% of the total). Imported coal seems to have substituted domestic production of coal with an increase in its share from 10.8% to 14.8%. Total primary energy supply accelerated over the 2010's reaching at an annual average rate of 5.12%, from 3.97% of the previous decade.

On the demand side, the power sector expanded at average rates of 4.9% and 3.9%, respectively. The share of coal in the generation of electricity (net of own utilization of electricity and

petroleum in the generation and energy consumption) increased its share by 5 percentage points with an increased rate of growth of 7.2% over the second decade, up from 5.9% over the previous one. Industrial production, as well, maintained its reliance on coal with a share of 25% in its energy consumption at an annual rate of increase of 2.7% over 2010-2021.

Overall, the most noticeable observation of the neoliberal era (post-1990, as intensified with the complete liberalization of the capital account) is the declining trend of the share of domestic sources an aggregate primary energy supply. Data derived from the Annual Energy Balances of the Min of Energy and Natural Resources corroborate this assessment and is portrayed in Figure 4.

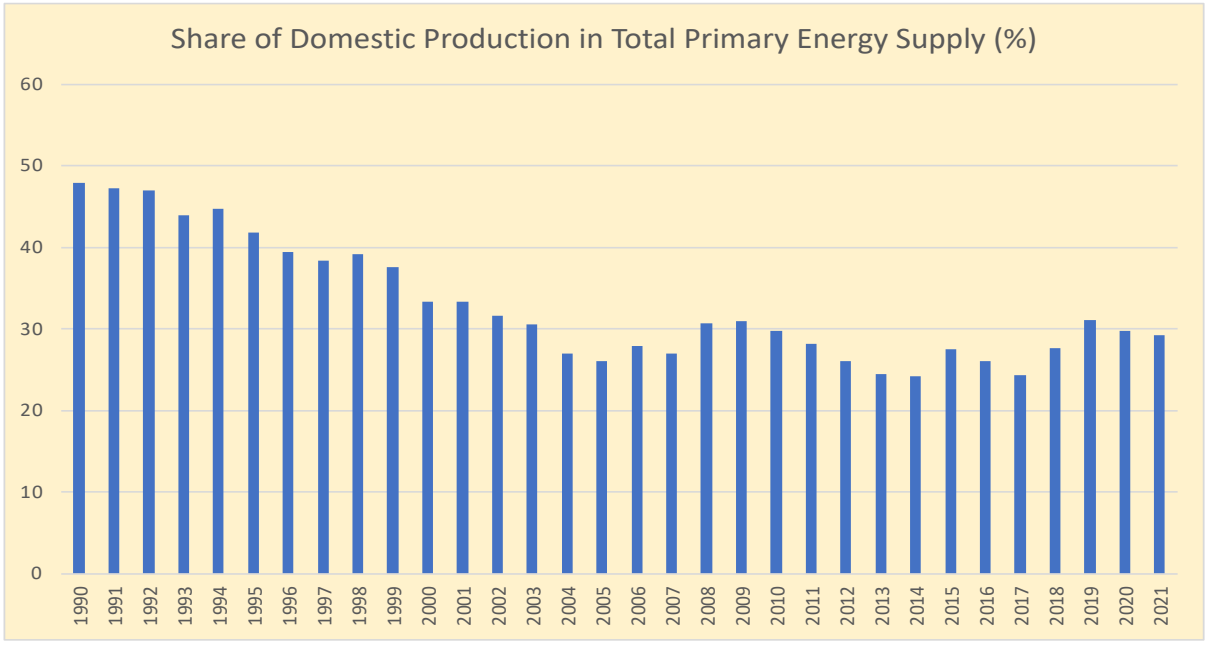


Figure 4: Share of Domestic Production in Total Primary Energy Supply (%)
Source: TR Ministry of Energy and Natural Resources, General Energy Balances

Figure 4 discloses that following the full liberalization of the capital account, the share of domestic production in total primary energy supply has declined rapidly from 47.9% in 1990 to 33.3% in 2000. This trend continued under the AKP governments as well and reached to 26.5% in 2005, stabilizing around at that plateau then after. Thus, the onset of capital account liberalization has meant, among many other things, intensified dependence of the domestic economy on energy imports. Trapped within the constraints of the *Diaz Alejandro-Taylor cycle* discussed above, the pre-mature financialization of Turkey meant not only a problem of balance of payments problems and monetary policy design, but also invigorated a structural shift towards

increased import dependence on energy and strategic intermediates manufacturing sectors. Availability of cheap bonanza of short-term finance capital, along with a structural tendency towards currency appreciation constrained opportunities of domestic production of energy and intermediates, and trapped the indigenous economy to structurally binding current account deficits. Figure 5 narrates the elements of this pathway.

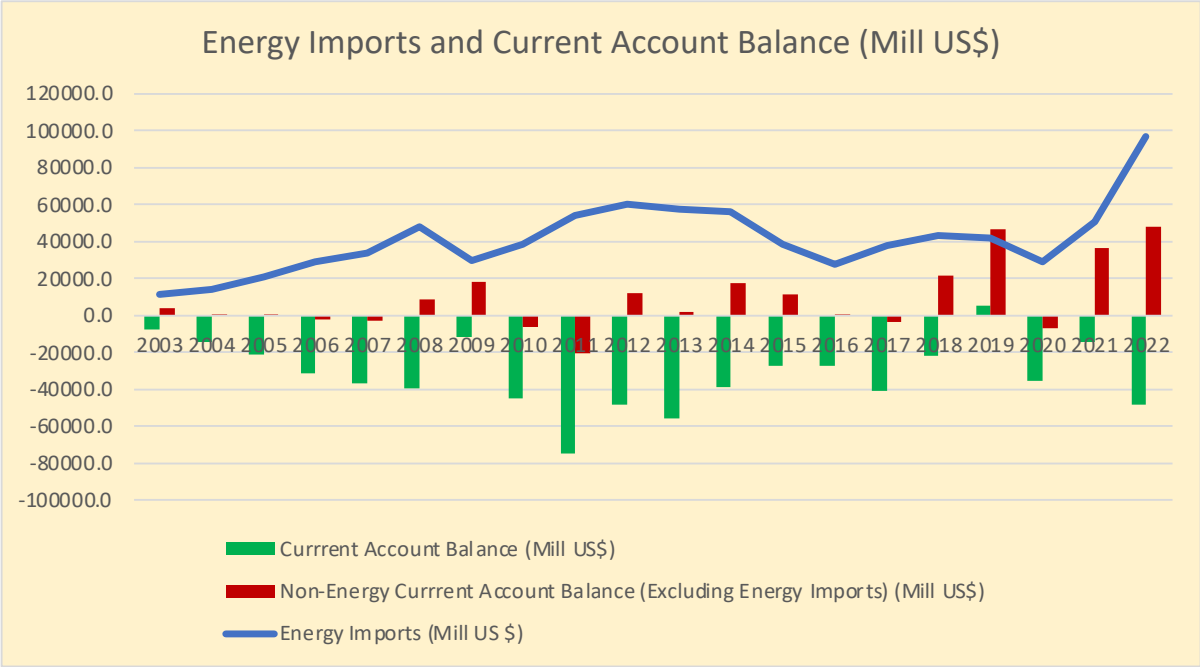


Figure 5: Energy Imports and Current Account Balance (Mill US$)
Sources: TR Central Bank, electronic data dissemination, *evds*; TurkStat, International Trade Statistics

The toll of the increased dependence on energy imports is visible especially over the second half of the decade. As the domestic economy is being driven by *speculative growth* patterns with a decline of the savings effort, the current account deficit widens deeper with the import-hungry energy requirements of the domestic industry. Figure 5 discloses that, with the minor exceptions in 2011, 2017 and 2020, the current balance would have shown a *positive* balance after the global financial crisis of 2008, if energy imports would have been netted out.

III-2. Continued Reliance on Fossil Fuel-Based Technologies in Energy Production

The official discourse on the technical design of the power sector disclose increased (continued, at best) reliance on fossil fuels. An important institutional step has been the operationalization of the so-called *Turkey Capacity Mechanism* (TRKM). *TRKM* has been established in 2018 with the

main purpose of sustaining supply security in the electricity market, with targets over the development of a sufficient power capacity for the domestic economy. It set out official guidelines on incentives towards domestic suppliers, their investment projects, and future installations. Power plants joined the *Capacity Mechanism* starting 2018, and by 2019 a total 43 stations were already under the coverage of the TRKM (Durmaz, *et. al.*; 2022). Durmaz, *et. al.* (2022) note that an important disclosure of the original TRKM regulation dated 20 January 2018 was its omission of the hydro, wind and solar based renewables stations that are already incentivized under the newly invoked "*Renewables Energy Sources Support Mechanism*" (YEKDEM)[6].

Over the course of this episode private sector has been charged with a leading role in the establishment of a market-based energy economy and has been subsidized significantly as the state chose to leave the sector to unfettered market forces. Yet, the prevalence of high fixed costs of upfront investment requirements precluded the warranted initiatives. The pragmatic policy option was the generation of a two-tier pricing scheme; one being the *Market Clearing Price* (MCP) as settled in the Istanbul Stock Exchange – Energy operations and the second one is set by the unit costs of the YEKDEM stations. Under the *TRKM*, the power stations (almost all fossil fuel based) received payments more than the MCP levels. In other words, per KWh electricity produced, stations under the TRKM captured subsidized payments exceeding the market clearing prices. Durmaz *et.al* (2022) report that such subsidization in excess of the average MCP, reached to 3.2% in 2018 and to 5.9% in 2019.

Chamber of Mechanical Engineers, in its 2022 Report on The Energy Outlook (TMMOB, 2022), document that the total sum of excess payments to the private sector power plants was 0.48% as a ratio to aggregate GDP in 2018 and increased secularly to 0.62% by 2020. As a ratio of the gross production measured in market clearing price (MCP) values, these meant subsidy rates of 29.98% in 2018 and 43.75% in 2020 (See Table 3).

[6] With a Decree dated 10 November 2018, hydro stations were later added to the TRKM coverage.

	2018	2019	2020
YEKDEM Payments in Excess of Average Market Clearing Price	11.60	16.92	25.35
Payments in Excess of Average Market Clearing Price for Domestic Coal Plants	0.96	2.02	2.17
Capacity Mechanism Payments	1.41	2.00	2.20
Investment Subsidization for Natural Gas Power Plants	4.13	1.52	1.50
TOTALS	18.10	22.46	31.22
memo items :			
As % of GDP	0.48	0.52	0.62
As % of the Gross Market Clearing (MCP) Value	29.98	34.21	43.75

Table 3. Excess Payments and Subsidization of the Private Power Plants (Billions TL)
Source: TMMOB, Chamber of Mechanical Engineers, 2022.

Under these developments, it will be illuminating to decipher the official projections of the Ministry of Energy and Natural Resources with respect to electricity production pathways. Gümüşel (2014) summarizes succinctly the 2012-2030 electricity projections of the Ministry. Accordingly, total electricity production is projected to reach 619 TWh in 2030 (to compare, up from 210 TWh in 2010). Projected shares indicate that by 2030, fossil fuels still account for 55% of total electricity production, and the share of nuclear sets in with a projected value of 11% (Figure 6).

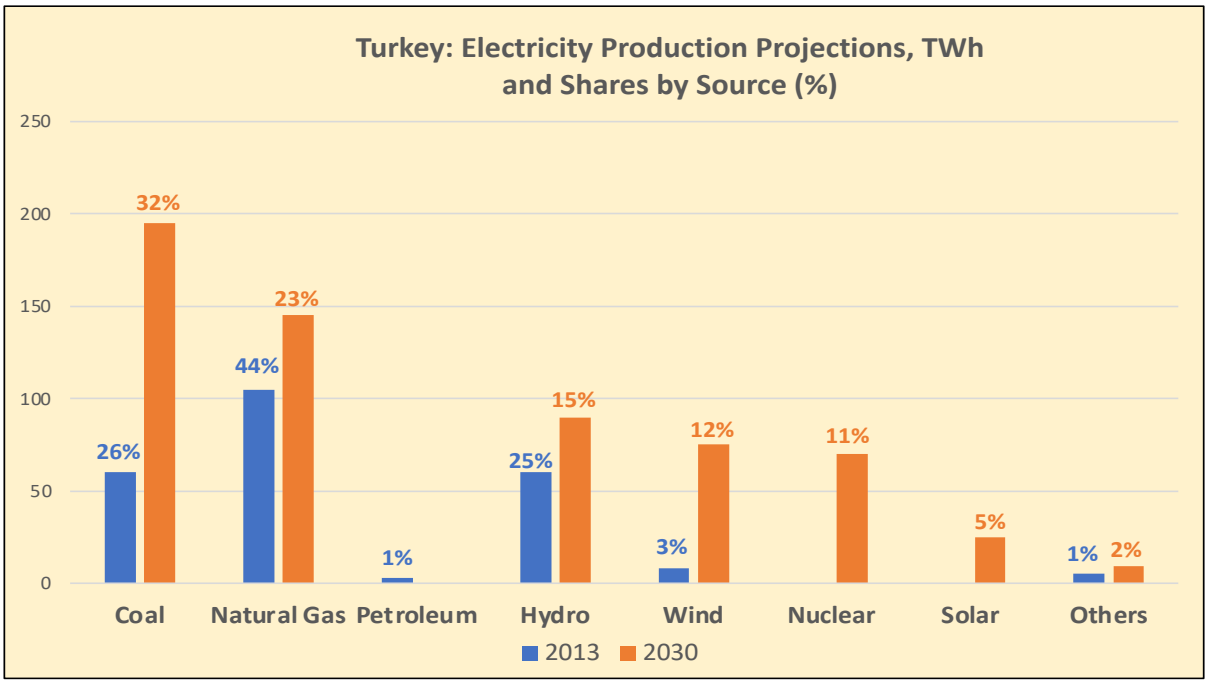


Figure 6. Excess Payments and Subsidization of the Private Power Plants (Billions TL)
Source: Gümüşel (2014); Min of Energy & Natural Resources

III-3. Pathways of Emissions and Production Technology

As such, the ongoing trends on gaseous emissions reveal that, similar to other comparable countries, Turkey has not yet decoupled its economic growth mainly due to her heavy dependence on energy and capital-intensive growth. A simple correlation between annualized rates of GDP growth and CO2 emissions, as depicted in Figure 7, lead to covariance of 0.49; with almost a uniform conformity between the two pathways.

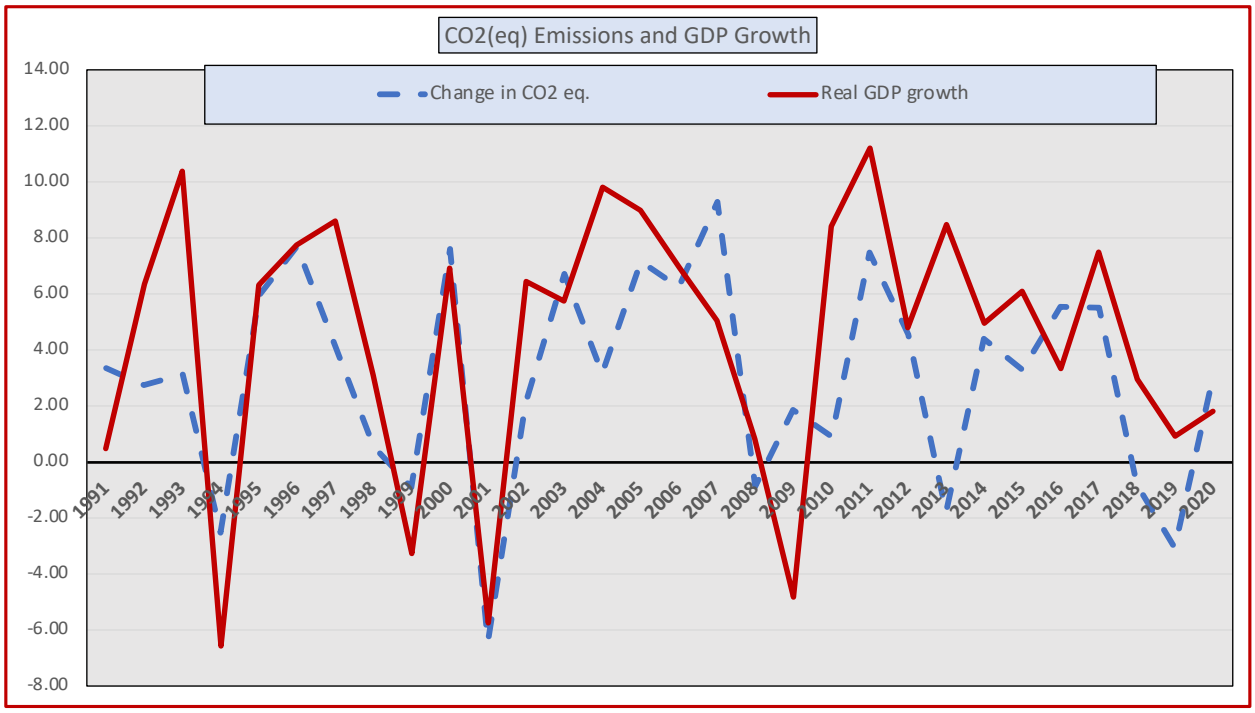


Figure 7: Turkey: Annual Rate of Change in CO2(eq) Emissions and GDP, 1990-2021
Source: Author's own calculations from Turkstat data.

As Figure 7 portrays, the swings on the rate of growth of GDP are closely matched with the pathways of CO2(eq) emissions all through 1990 to current date. One of the main reasons for this sustained co-variation is the reliance of the domestic economy on energy imports almost with zero price elasticity and over-reliance on fossil fuels in the power sector. According to TURKSTAT, CO_2 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, as highlighted above, 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.

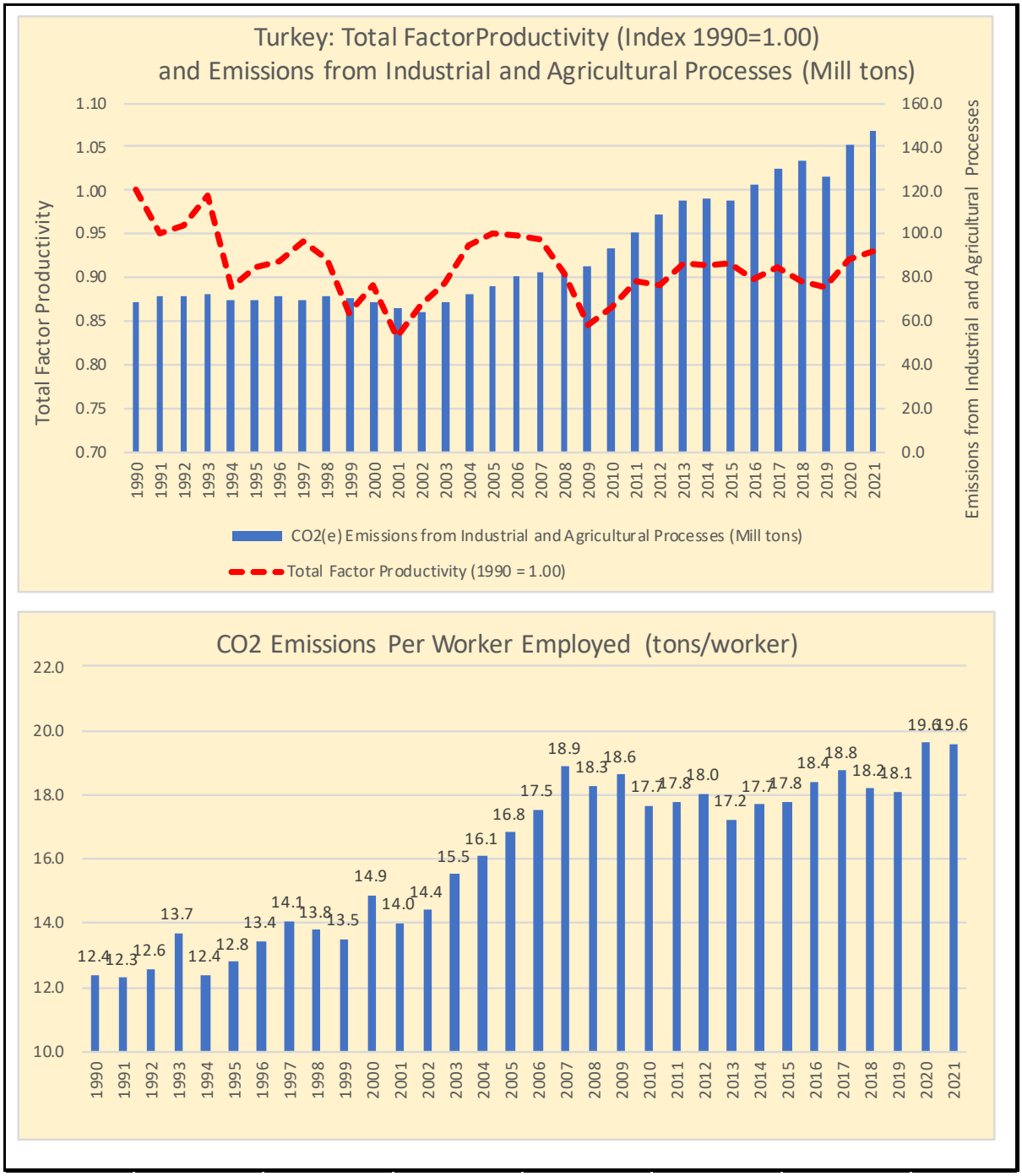
One of the key technological attributes of speculation-led growth driven by hot money finance is known to be the secular rise of capital intensities leading to structural unemployment across the late-industrializers. In fact, capital per unit employment has been an indispensable characteristic of many emerging market, developing economies which had prematurely deregulated their capital accounts in an attempt to integrate with the global financial markets.[7] Availability of the

[7] For more elaboration, see*e.g.*, U of Groginnen Penn World Tables at https://www.rug.nl/ggdc/productivity/pwt/?lang=en

cheap bonanza of short term finance, often accompanied by currency appreciation, diverts resources away from labor towards (mostly imported) relatively cheaper capital. This resource mis-allocation problem had been highlighted vehemently in Taylor (1991, 2004), Ros (2013) and recently in Akyüz (2017). Orhangazi and Yeldan (2023a) confirm this assessment for Turkey's neoliberal transition. They report that, measured in fixed TL prices, utilization of capital per worker employment has doubled from 1989 (completion of Turkey's capital account deregulation) to the eruption of the global financial crisis in 2008, from TL4,000 to 11,600 (an increase of almost 3-folds); and then hovered around that rate for the remainder of the 2000s up to date (Orhangazi & Yeldan, 2023a).

The fragile and volatile nature of Turkey's economic growth over the post-2000 era also led to a severe shortening of the macroeconomic time horizon, negatively affecting fixed investment decisions to upgrade technical change. The result, among many other setbacks, has been the low productivity performance of Turkey's overall economic activities. Based on these assessments, one can also highlight the dire consequences of this rather poor performance on the intensified carbonization patterns of the domestic production structure.

Figures 8.1 and 8.2 highlight two segments pertaining this observation: The first one documents the rapid rise of CO2 emissions emanating from industrial and agricultural economic activity and contrasts this pathway with the trend index of total factor productivity (TFP) growth. In Figure 8.1 the rapid acceleration of emissions after 2005 is clear, the year when Turkey's productivity performance starts to crumble. The argument that the capital-intensive production patterns of the speculation-led growth trajectory has been one of the key reasons of inertial structural unemployment was already mentioned. Thus, another key outcome of this capital-biased trajectory has been the rapid rise of emissions per worker. As can be followed directly from the lower slide seen in Figure 8.2, emissions per labor employed hover around 13 tons per worker from 1990 to 2001, and then start to accelerate rapidly under the speculation-led growth era (2002 to current) from 14.4 tons per worker, to 19.6 tons/worker.



Figures 8.1 and 8.2:
Sources: Author's calculations from Turkstat Environmental Statistics and the University of Groningen, Pwt data base, https://www.rug.nl/ggdc/productivity/pwt

IV. Assessment of Climate Policies

As has been documented above, Turkey has been experiencing a dramatic change with respect to its escalated utilization of primary energy sources and accelerations in per capita gaseous emissions. The bulk of its electricity generation technology relies on 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. In order to decrease the reliance on foreign energy sources, ensure energy security, and meet the growing energy demand, Turkey has pursued strong commitment to utilization of all the domestic coal resources, together with its plans to install three nuclear power plants in the near future. On the other hand, the potential of renewable resources such as solar, geothermal, and wind remains hugely untapped in producing energy.

Despite these attempts, it is still a general observation that Turkey does not yet have a clear strategy towards de-carbonizing its development pathway, in particular its power sector (Şahin *et.al.* 2021; TÜSIAD, 2016; and Şahin, 2016). In particular, Şahin (2016) writes, "T*urkey's climate policies can be defined through its fixation on its special circumstances with regard to the climate regime. This position is mostly utilized in order to keep Turkey away from any emission reduction targets and to sustain its low-tech and high- carbon developmentalism.*" Thus, "*this defensive position persisted, and efforts for international recognition of Turkey's special circumstances remained the number one priority in Turkish climate politics*" (p.121).

Thereby, the priorities of Turkish climate policy mostly rest upon the arguments of "special circumstances" noting for the relatively low share of responsibility in global emissions. To see Turkey's position more clearly, Table 4 documents the relevant data in the global emissions arena.

	2000	2010	2019	Annual Rate of Change over 2000-2019
CO2 emissions (kt)				
Turkey	216,400.0	297,110.0	396,840.0	3.19
Upper middle income	3,846,860.0	4,700,769.9	5,131,190.0	1.52
Middle East & North Africa	1,331,978.7	2,137,451.1	2,555,925.5	3.43
Europe & Central Asia (excluding high income)	2,582,853.9	2,846,013.4	2,942,675.3	0.69
World	23,445,433.3	31,043,477.0	34,344,006.1	2.01
CO2 emissions (kg per 2015 US$ of GDP)				
Turkey	0.523	0.484	0.398	-1.43
Upper middle income	0.727	0.586	0.531	-1.66
Middle East & North Africa	0.743	0.791	0.738	-0.03
Europe & Central Asia (excluding high income)	1.706	1.153	0.905	-3.34
World	0.485	0.479	0.406	-0.94
CO2 emissions (metric tons per capita)				
Turkey	3.375	4.059	4.754	1.80
Upper middle income	3.145	3.805	3.973	1.23
Middle East & North Africa	4.149	5.371	5.401	1.39
Europe & Central Asia (excluding high income)	6.969	7.507	7.364	0.29
World	3.816	4.454	4.436	0.79

Table 4. CO2 Emissions Intensities: Turkey and Comparable Regions
Source: World Bank database: World Development Indicators: https://databank.worldbank.org/source/world-development-indicators#

As can be seen, Turkey has been increasing its total CO2 emissions at an annual rate of 3.19% over 2000s, and as such it reveals a higher rate against the global, as well as the comparable regions. This assessment is particularly valid for per capita emissions, which had been increasing at almost the double rate of the global average. CO2 emissions per US$ GDP is observed to maintain a falling trend, indicating some modest gains in efficiency. Even so, the rate of depletion of the domestic natural resources and the exhaustion of the environemnatl wealth are developing at alarming rates. The World Bank's Concept note on Turkey's INDC (World Bank 2016), makes this point clearly by stating that "*Natural capital has been depleted in recent years and this trend should be an area of concern that merits attention.* (…) *Resource depletion and environmental degradation have driven adjusted net savings (ANS) down by 1-2% of the Gross National Income (GNI). The percentage of natural resource depletion in total GNI has doubled from 0.16% in 1995 to 0.32% in 2016. In terms of total wealth, despite it nearly doubling between 1995 and 2010, the amount of total natural capital decreased over the same period from US$907 billion to $511 billion while the per capita natural capital decreased by more than half from US$15,499 to $7,095*".

The main document that reflects the official stance of the country in setting a specific trajectory for abatement is that of the (Intended) Nationally Determined Contribution that was submitted to the Paris COP Meetings in 20 September 2015.[8] Under this framework, Turkey declared its commitments as 21% reduction from its projected base-path. (See Figure 9). Accordingly, it was projected at under a base-path depicting unchanged historical conditions, Turkey's aggregate GHG emissions would reach 1,175 million tons in 2030. This would mean doubling of its CO2 (eq) emissions over its 2012 levels in the course of 18 years. The INDC, in turn, has declared its intention to reduce these emissions by 21% to 929 million tons by 2030.

[8] Nevertheless, Turkey had been reluctant in ratifying the Paris INDC Agreement from its parliament as late as October 2021. Turkey was among the remaining few countries that had not been a party to the Agreement by then. Along with Turkey the remaining five were Eritrea, Libya, Iraq, Iran, and Yemen.

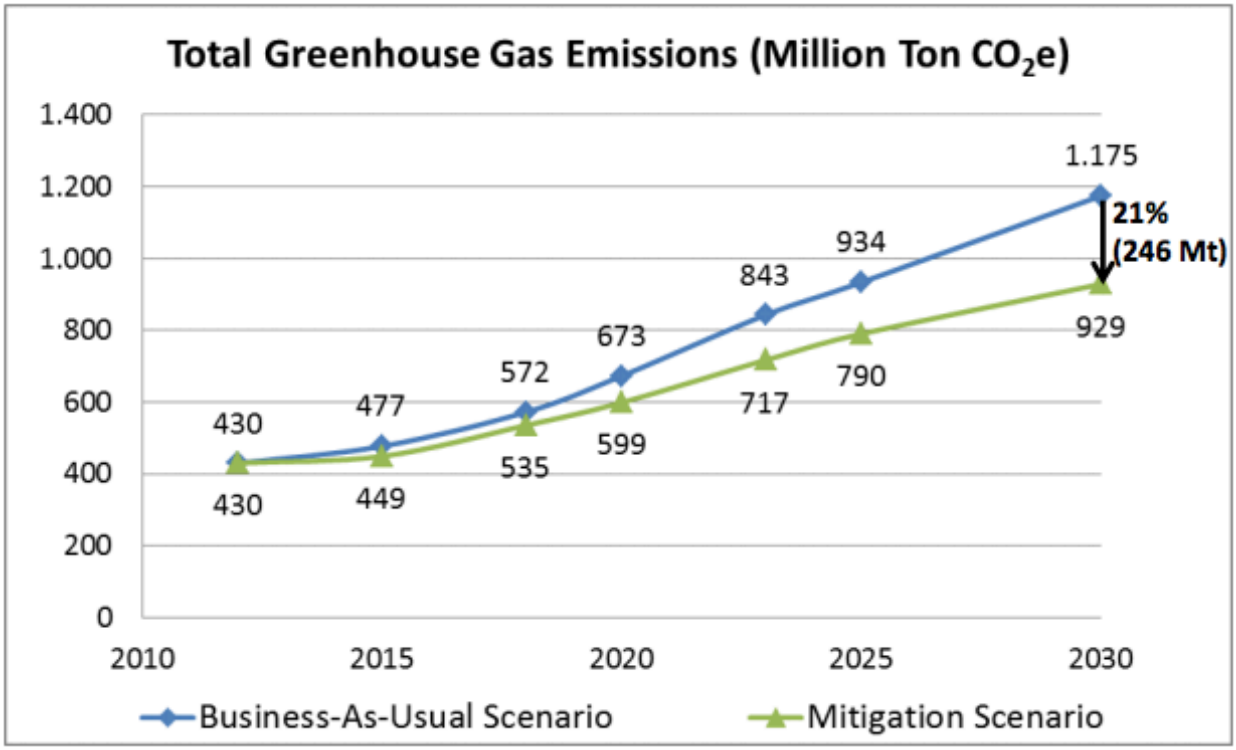


Figure 9.
Source:
https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Turkey/1/The_INDC_of_TURKEY_v.15.19.30.pdf

This declaration has been regarded as a very poor commitment by the scientific community and was accused of making use of exaggerated base-path projections that will enable the country to eventually display a reduction even without any real abatement achieved. United Nationa Environment Program (UNEP) has been critical of Turkey's meager INDC efforts and attested that along with Russia and India, Turkey were the three countries that display abatement targets exceeding the commitments of the Paris INDC pathway (UNEP, 2019).

More recently Turkey has joined the international community in setting out *net zero emissions* (NZE) targets which had become a new round of climate diplomacy advocacy. Turkey's NZE has been declared to be reached by 2053 (resonating the 600th anniversary of the conquest of Istanbul –then Constantinople). The specifics of the 2053 NZE pathway are not yet declared officially. Yet quite many independent studies have already dealt with the subject.

In its modeling study within the CCDR (Country Climate and Development Report), for instance, the World Bank (2022) claims that "*Turkey can achieve its 2053 net zero emissions target (figure S.3) but this will require major changes in many economic sectors. The transformation includes deep decarbonization of the power sector; a combination of energy efficiency and electrification in buildings; and*

electrification in transport; a change in current practices to maximize carbon sequestration from forest landscapes". Accordingly, Turkey's aggregate emissions ought to reach its peak in 2023 and be reduced to 120 million tons in 2053. This magnitude is envisaged to be *netted out* by an extensive re-forestation campaign. The model's hypotheses with respect to its base-path projections disclose a cumulative increase of 18,055 million tons over 2022-2053; to be reduced to 10,153 million tons under a *resilient and net zero pathway (RNZP).*

The World Bank's CCDR modeling effort further emphasizes transition from coal under the grounds that "… *even without a carbon constraint, new coal power plants are neither needed nor the least-cost option to meet growing electricity demand. Instead, Türkiye can achieve energy security through an accelerated pace of least-cost investments in domestic solar and wind—building on its track record of tripling renewable energy capacity in the last decade—and investing in energy efficiency, battery and pumped storage, geothermal, and gas generation with carbon capture and storage"* (emphasis mine).

In contrast, an alternative modeling exercise under the Istanbul Policy Center (Şahin *et., al.*, 2022) has projected that under a base-path scenario Turkey would need to increase its electricity production to 460 TWh in 2030 and to 769 TWh in 2050. According to estimates of this historically given business-as-usual (base) path, emissions produced by the fossil fuel power stations would increase to 280 million tones in 2050 (up from its current level of 149 million tons). Şahin *et., al*, 2022) document that by expanding its wind and solar based installation capacity at a rate of 3 GW per year for each source, Turkey can reduce its emissions due to electricity production down to 15 million tons by 2050. The main component of this NZE pathway being a requirement of coal phase out by as late as 2035.

V. Concluding Comments: Towards A Resilient, Green and Egalitarian Development

Turkey's macroeconomic outlook displays a typical late-industrializer / developing market economy trapped within the constraints of its growing population and speculation-driven patterns of growth. Its overall ambitious targets on (green-?) industrialization are marred with the short-termism and rentier characteristics of its investment patterns, and a heavy reliance on (imported) fossil-fuel based production and consumption patterns which, in turn, had 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 had been a fragmented labor market along with dualities and wide-spread gaps in resource allocation and intensified foreign

dependence on energy resources. All of these had played a key role in hindering possibilities of transition towards a sustained and egalitarian green economy.

Turkey is in a conjuncture where the urgency for a new growth model is increasing. As stated originally in Orhangazi & Yeldan, (2023c), it is my contention that the main premise of this alternative growth model emphasizing the *green industrialization strategy* should include:

- transition from fossil fuel-based production to sustainable and renewable forms of energy, industry and agricultural activities to be led by a *socially responsible*[9] state sector;
- addressing informalization and fragmentation of labor markets and installation of decent job programmes;
- addressing wide imbalances of incomes and opportunities across not only wage labor and capital or the regional sphere, but also over gender, ethnicity and all forms of social exclusion;
- granting a realistic role to the geographical regions in resource mobilization and resource allocation within principles of social evaluation, rather than myopic expectations of the oligopolistic markets.

This leaves not only Turkey, but almost the whole developing world within a tacit dilemma, which can be stated in the words of UNCTAD (2021) "*of having to pursue economic development while keeping emissions and resource consumption within the ecological limits of the planet*" (p. 105).

[9] Arguments of which can be found in Taylor, 2004 and Telli, et al. 2006.

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