

UNVEILING THE JUST TRANSITION: POLICY IMPLICATIONS AND DESCRIPTIVE DATA INSIGHTS FOR COAL MINERS IN TÜRKIYE

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The imperative to reduce greenhouse gas emissions and limit global warming to 1.5°C above pre-industrial levels, a key objective of the 2015 Paris Agreement, necessitates an urgent shift away from coal. Since the agreement's inception, major coal-producing countries in Europe, including Germany, Greece, and the UK, have set ambitious coal exit targets by 2030.¹ This transition signifies the potential displacement of nearly five million miners globally, resulting in substantial welfare challenges.² Securing the interests of workers and communities impacted by the energy transition is becoming a critical component of global climate politics. The 2021 UN COP26 Just Transition Declaration affirms that countries are committed to supporting workers, communities, and regions that are vulnerable to the impacts of transitioning away from carbon-intensive economies.³ Likewise, the Just Transition Mechanism within the European Green Deal (EGD) aims to ensure a fair and equitable transition, leaving no one behind.⁴ At the 2019 UN Climate Action Summit, 46 countries committed to integrating employment into their climate actions and promoting a just transition. By October 2022, 65 out of the 170 countries that had updated their Nationally Determined Contributions explicitly referenced a just transition, underscoring its increasing importance on the global stage.⁵

Until recently, Türkiye, among the world's top twenty coal producers and where more than three-fourths of the energy demand is met by fossil fuels, has been slow in its decarbonization efforts.⁶ However, with the introduction of the EGD and the Carbon Border Adjustment Mechanism (CBAM), Türkiye began to take action in the policy arena. By 2021, Türkiye had aligned with the EGD, ratified the Paris Agreement, and pledged net-zero emissions by 2053 at COP26.⁷ In late 2023, Türkiye introduced a draft Climate

Change Law emphasizing the enforcement of the Emissions Trading System and a subsequent Carbon Market Regulation.⁸ While a clear plan for fossil fuel phaseout and just transition is still absent, Türkiye's international commitments and private sector pressures to comply with the CBAM might arguably push policymakers to accelerate decarbonization and consider coal phaseout.

For the political feasibility and social acceptability of transition policies, it is crucial to gain prior knowledge about the potential risks and costs to workers and communities that result from transitioning away from coal. This knowledge might also help to identify whom to target and what types of social protection measures are needed to ensure a just transition. With this objective in mind, this policy analysis focuses on the group directly affected—miners working in hard coal and lignite extraction—and attempts to shed light on their potential welfare losses due to exiting the coal sector. This analysis provides some descriptive evidence from the administrative data of the Entrepreneur Information System (EIS) and field data from Soma, Manisa, a prominent coal district. Before delving into this analysis, we will first touch on the current discourse surrounding this issue in Türkiye.

How Is the Just Transition Debate Handled in Türkiye?

The discussion on Türkiye's energy transition toward carbon neutrality is predominantly spearheaded by environmental NGOs and climate researchers. Although phasing out coal is not yet on Turkish policymakers' agenda, there is a growing body of literature exploring the economic, social, labor market, and environmental impacts of the coal sector in Türkiye.⁹



Concurrently, the discussion on a just transition in the country largely centers around the coal exit discourse, a conversation first initiated by the Climate Action Network Europe in 2019.¹⁰ In a 2022 report, the World Wide Fund for Nature (WWF) presents a roadmap for a just transition, with a strong emphasis on exiting coal to achieve carbon neutrality and on the simultaneous planning and implementation of just transition strategies in coal regions.¹¹ SHURA, in its latest 2024 report, brings industrial policy into the conversation, suggesting a shift in industrial policy away from low-tech, low-value-added, carbon-intensive production. The aim of such policies is to boost economic competitiveness while fostering sustainable development and facilitating a just transition.¹²

Despite increasing attention on the concept of a just transition in research, quantitative analyses focusing on the employment and welfare effects of the transition remain limited and predominantly confined to industrialized nations.¹³ Recent studies on Türkiye by Acar and Kizilkaya (2021) and Asik and Özen (2023) provide a comprehensive profile of coal workers and regions using data from Household Labor Force Surveys.¹⁴ Building on their findings, we aim to assess the potential costs of job losses in the coal sector. To do this, we will present descriptive statistics detailing the wage profiles of coal miners before and after job displacements, utilizing social security records and business registers from the EIS data. Prior to exploring this analysis, we take a closer look at coal mining regions and workers in Türkiye, drawing on insights from qualitative data.

A Closer Look at Coal Mining in Türkiye

The coal mining sector in Türkiye employs approximately 34,000 workers as of 2021, down from around 44,000 in 2012, according to EIS records. Coal mining accounts for only about 0.3% of total employment on average, even in the five provinces most reliant on coal-based economies: Manisa, Muğla, Zonguldak-Bartın, Kahramanmaraş, and Çanakkale. Conversely, in Zonguldak, the province with the highest sectoral employment, the share of coal mining in employment stands at about 6%, as per the 2020 data.¹⁵ Although coal mining constitutes a small fraction of total employment, the broader impact of the transition reaches far beyond the direct effects on employment.¹⁶ Many coal regions lack economic diversification and viable job options. This situation is further complicated by the remote locations of many mining areas, small mining communities where the local economy merely depends on coal and with a strong community identity tied to mining activities.¹⁷

In Türkiye, coal mining is primarily concentrated in the Western Black Sea and Inner Aegean regions. The Western Black Sea region, known for its hard coal mining and related industries, has seen its local economy deeply influenced by these activities. In contrast, the Inner Aegean region has a more diversified economic structure, with a growing renewable energy sector, especially in solar and wind energy, driven by favorable climatic conditions. The level of economic diversity and the overall development of a region significantly determine the availability and quality of alternative job opportunities outside the coal sector. As a result, the impact of the transition from coal varies considerably across different regions.



The focus of this section on Soma and Zonguldak—the key coal mining centers of these regions—presents a particularly interesting comparison. This interest arises not only from their distinctive characteristics, inherently rooted in their geographical and economic structures, but also from their interconnected relationship in the labor supply for coal mining.

Zonguldak, in the Western Black Sea coast, is the sole hard coal source in the country. This city has a long history of state-operated mining under the control of Turkish Hard Coal Enterprises, a State Economic Enterprise (SEE). Since the 1980s, Zonguldak has experienced a gradual decline in the coal industry through the implementation of a gradual phaseout policy. This policy halted the recruitment of new personnel, initiated the right to early retirement, and suspended new investments. Throughout the 1990s and 2000s, this phaseout continued with a series of privatizations and/or closures of the pits.¹⁸

The Soma Coal Basin, including coal pits in the Soma District of Manisa and the Kınık District of İzmir, is the predominant coal region in Western Anatolia, with a long history of lignite mining dating back to the late 19th century. Until the mid-2000s, Turkish Coal Enterprises, the main SEE for coal, operated the majority of the coal fields in the basin, alongside small and medium-sized private coal firms. In accordance with the nationwide act to privatize coal extraction by the early 2000s,¹⁹ the operations of the underground coal pits in the Soma Basin began to be transferred to private firms through royalty tenders.²⁰ The unique aspect of the royalty tenders in this case is the state guarantee of purchase provided to the coal firms, which serve as the sole customer of coal in Türkiye irrespective of the amount of coal extracted. This guarantee has some important employment

implications as it enables coal firms to accelerate extraction using labor-intensive, low-cost methods, thereby making coal mining a more profitable sector for both existing and newly emerging capital groups.²¹

The immediate impact of the royalty tender in the Soma Coal Basin has been a surge in underground coal mine investments, which significantly increased the number of miners. The labor supply has been met by newly dispossessed local tobacco producers and miners who migrated from declining mining regions such as Zonguldak and Kütahya. Interviews conducted between 2016 and 2018 in the Soma Coal Basin recorded severe issues of unemployment and job precarity due to the phasing out of mines in those two regions, where predominantly small-scale or even illegal and unregistered operations fail to provide decent employment. The situation in Zonguldak was described as particularly dire, with a lack of new investments and the prevalence of illegal pits instead of corporate companies, prompting many to leave their hometowns in search of work elsewhere. Concerns about early retirement and the physical strain of mining were also noted as significant issues facing workers in the industry, underscoring the economic and social challenges in the mining sector.²²

Despite experiencing a fatal disaster in Soma ten years ago, miners have noted in interviews that conditions have become relatively safer, attributing this improvement to investments by larger, more institutionalized firms and state support for coal companies in the context of royalty tenders. This support ensures that Soma's mining operations are financially more stable, with regular payments and better wages and working conditions compared to those in many other (skill-equivalent) sectors and for miners in other coal pits, including Zonguldak.



This disparity potentially creates resistance to exiting the coal industry, thereby complicating the social acceptability of the transition and necessitating a more thoroughly designed just transition strategy.

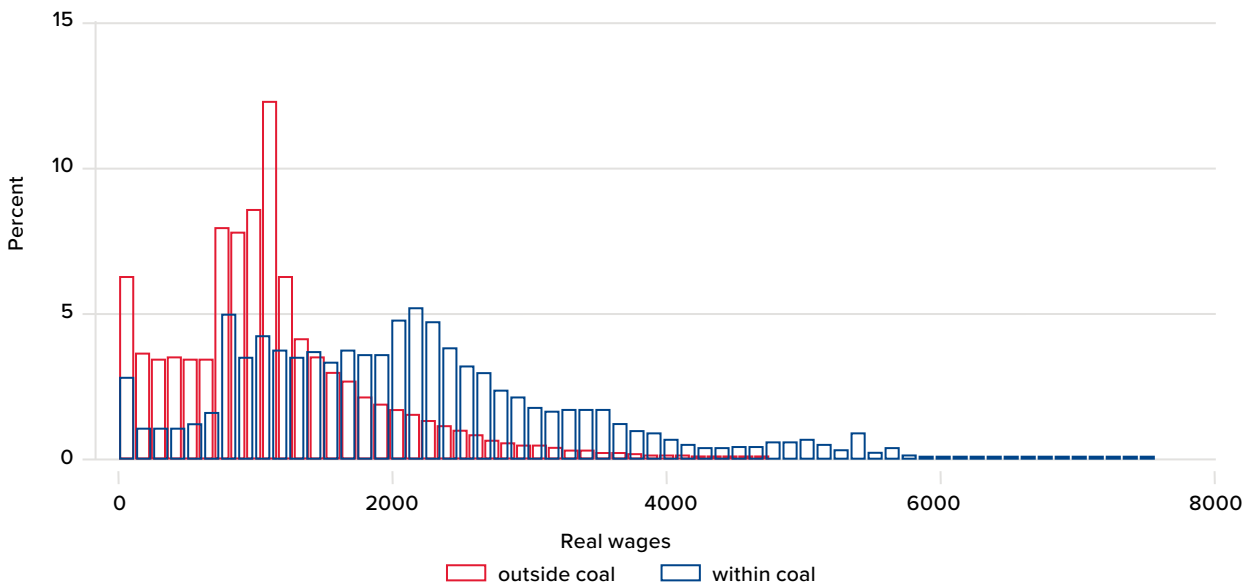
Potential Earning Losses of Coal Miners

To better understand the welfare implications of transitioning away from coal jobs, this section examines the wage profiles of coal miners compared to the potential earnings they could achieve outside the coal industry. For this and subsequent analyses, we use quarterly worker records and business registers from the EIS database covering the period of 2012–2021. Our analysis is confined to individuals who were employed in coal mining at any point during this period. Consequently, our intersectoral

comparisons are restricted to the coal mining sector and other sectors that have employed coal miners at some point within the timeframe of our study.

Our analysis reveals that wages in coal mining significantly exceed those in other sectors, with average wages outside coal being approximately 60% of those earned by miners. This significant disparity is highlighted by the right-skewed wage distribution outside of coal mining in contrast to the relatively more normal distribution of wages within the sector, as illustrated in Figure 1. This finding aligns with observations in other coal-reliant countries like Germany and the UK, where miners tend to be relatively better compensated.²³ This wage disparity underscores the complexity of achieving a just transition—one that ensures the preservation of welfare standards for displaced workers by providing equitable and adequately compensated employment alternatives.

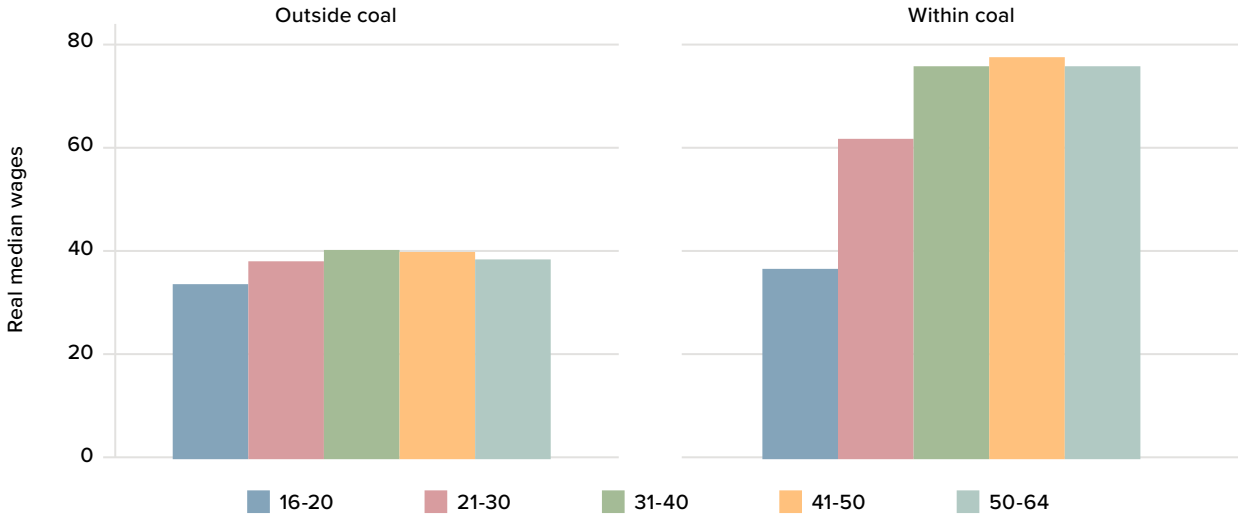
Figure 1. Real Wage Comparison: Inside vs. Outside the Coal Mining Sector



Note: Authors' computations based on EIS data. The calculation of real monthly wages is adjusted for inflation using the Consumer Price Index (CPI), with 2010 set as the base year (index = 1) for the analysis.



Figure 2. Daily Wage Comparison by Age: Inside vs. Outside the Coal Mining Sector



Source: Authors' computations based on EIS data. The calculation of real monthly wages is adjusted for inflation using the Consumer Price Index (CPI), with 2010 set as the base year (index = 1) for the analysis.

A couple of demographic issues are worth noting: As of 2021, only about 3% of the workforce in the coal mining sector was female, indicating that the findings discussed are primarily reflective of the male sample. Regarding the age profile, coal miners exhibit a humped-shaped distribution, with a peak in the 31–40 age group. A significant majority (approximately 47%) falls within this category. Consistent with expectations, wages increase with age, peaking in the 41–50 age group, and then slightly decline for the oldest workers, as illustrated in Figure 2. The youngest miners (16–20) earn significantly less than their older counterparts, slightly more than half of what those aged 21–30 earn. For other age groups, the difference is less marked, especially beyond the age of 31. When examining the wage distribution outside the coal sector, the variation in wages across age groups, while following a similar pattern, is less pronounced. This could be ascribed to the higher wage premiums earned by middle-aged and older workers, which are likely to diminish in jobs outside the coal industry.

Consequently, developing policies tailored specifically to support middle-aged workers is critical. This group is especially at risk of substantial earnings losses due to the transition and cannot benefit from early retirement options.

The education profile of the workforce stands out as a crucial factor in determining the reemployment probability and, consequently, the extent of earnings losses. The absence of this information represents a significant limitation of the EIS data. Drawing on the 2020 Household Labor Force Survey findings documented by Asik & Özen (2023),²⁴ we can infer that there is no statistically significant difference in the average educational attainment of employees in the coal mining sector compared to other sectors. This is despite the noted over-representation of individuals with secondary school and both general and vocational high school qualifications in coal mining. Overall, the similar average education levels of coal miners compared to other sectors might ease their move to new jobs.



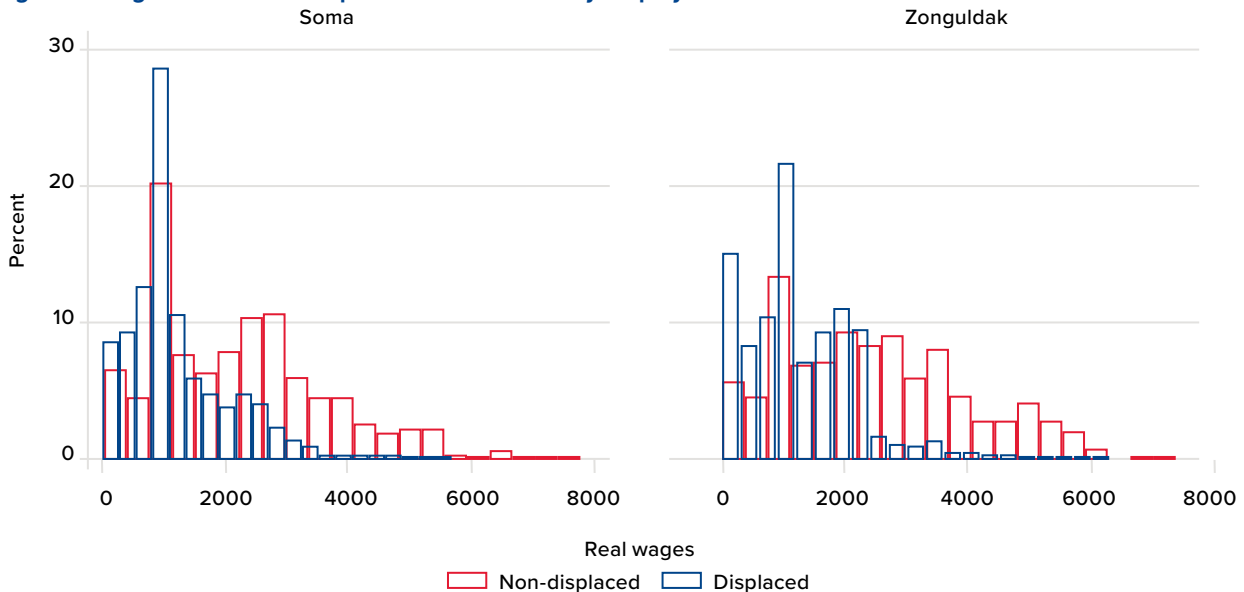
Next, we turn to the analysis of potential wage losses incurred from leaving coal jobs. To exclude voluntary separations, which could underestimate the wage losses, we define a firm experiencing a mass layoff as one with an employment decline exceeding 30%, following the seminal approach of Jacobson et al. (1993).²⁵ The displaced group, therefore, includes those who were initially employed in the coal mining sector and left their jobs or changed firms due to a mass layoff. When comparing the wage distribution of displaced miners to those continuously employed, we uncover suggestive evidence of a significant decline for displaced workers as a result of their displacement. Specifically, the unconditional mean of the real monthly wages of displaced miners is found to be 34% lower than that of non-displaced workers.

Our findings further indicate spatial differences, underscoring the need for strategies aimed at

a just transition to be tailored at the subregion level, accounting for local economic specificities. For instance, by examining two significant coal districts, Soma and Zonguldak, that have distinct economic structures and employment relations in the coal sector as previously discussed, our analysis suggests a more pronounced shift in the wage distribution toward the bottom tail in Soma compared to Zonguldak. This is evident in the more pronounced right-skewness in the wages of displaced workers in Soma, as depicted in Figure 3.

The wage losses associated with alternative employment options also depend on the sectors into which miners transition upon leaving the coal industry. To explore this, we calculate the transition probabilities of miners moving between sectors. Given our focus on individuals leaving the coal sector, our analysis is conditioned on having transitioned from coal.

Figure 3. Wage Distribution: Displaced vs. Continuously Employed Miners



Source: Authors' computations based on the EIS data. The calculation of real monthly wages is adjusted for inflation using the Consumer Price Index (CPI), with 2010 set as the base year (index = 1) for the analysis.



According to our computations, construction emerges as the most frequent destination for departing coal miners, followed by trade and other services. When examining the probability of transitioning to a new sector within one year, one-fifth of miners shift into construction, while about 28% leave the labor market entirely. Sectors such as trade and other services, along with manufacturing and the energy sector, are almost equally preferred destinations, with each sector representing roughly 10–14% of the transitions.

In discussions about inter-sectoral transitions, it is critical to recognize that the EIS database only covers registered employment, potentially leading to an overestimation of transitions out of the labor market due to the inability to track informal employment. Although informal employment in the coal mining sector is relatively low, as indicated by Asik & Özen (2023) and corroborated by field data from Soma, the agricultural sector, where over 80% of employment is unregistered, emerges as a viable alternative for coal miners.²⁶ However, this sector could not be considered in the previously discussed transition probabilities due to this data limitation. The role of agriculture is particularly relevant for specific regions like the Aegean, where the mining industry historically sourced much of its labor from former tobacco or agricultural workers.²⁷ Hence, the potential informalization of the workforce presents a critical concern that deserves focused attention in the discussions surrounding a just transition in Türkiye.

Finally, we delve deeper into the interconnections between agriculture and coal mining, supported by the field data. The privatization process initiated in the early 2000s has had profound repercussions on agricultural

production, notably impacting tobacco farmers in the Soma Coal Basin due to the withdrawal of state subsidies. This period saw the dismantling of the State Monopoly of Tobacco and Alcoholic Beverages (TEKEL) and the conversion of rural land for coal-fired power plants, mines, and highways. Concurrent transformations in coal mining led to significant gender imbalances in the labor market; as men from farming families shifted to mining jobs, women increasingly assumed roles in petty commodity production, wage labor, and subsistence farming. Fieldwork conducted between 2016 and 2021 shows that agricultural income alone is no longer sufficient for small-scale farming families. Men's earnings from mining often subsidize agricultural activities, while women engage in low-paid, unregistered agricultural work to supplement family income, particularly in times of financial strain. Interviews corroborate the survey data, revealing that unemployed miners face severe poverty and job insecurity, with casual and low-paid work in other sectors being much more precarious compared to mining, which offers higher wages and stronger social insurance. Consequently, unemployment is a major concern for miners, even more pressing than the serious health and safety risks associated with their work.²⁸

Concluding Remarks

The transition away from coal underscores the need for a just transition, particularly in mitigating socio-economic impacts on workers and communities. While the just transition concept spans various sectors and stakeholders, the present discussion concentrates on the challenges facing coal miners in Türkiye, who are among the first to be impacted by a potential coal phaseout.



Despite coal mining's limited role in Türkiye's overall employment landscape, phasing it out could significantly impact mining-dependent communities. The extent of these effects may vary substantially across different regions, depending on the economic structure and sectoral diversification of local economies. The current analysis focuses on the direct welfare effects on coal miners, acknowledging that indirect effects warrant further investigation.

Our findings reveal a significant wage decline for coal miners post-transition and underline the wage disparity between coal mining and alternative sectors, posing a challenge in maintaining welfare standards for displaced workers through equitable employment alternatives. The aggregate impact provides a broad, macro view, but it is essential to explore country-level imbalances, which are crucial for developing effective policy measures such as income support, early retirement options, and reskilling programs. Our analysis identifies substantial regional disparities; for instance, areas like Soma, which currently benefit from better wages, working conditions, and new coal investments, are likely to suffer more from the transition compared to regions like Zonguldak, where the coal industry is already in decline. Moreover, our results show that middle-aged workers, who predominate the mining sector, are particularly vulnerable. This highlights the need for region- and group-specific strategies to promote a just transition, adding layers of complexity to the transition process.

The findings presented should be considered indicative of the potential welfare costs associated with exiting coal, with a detailed econometric analysis of coal workers' earnings losses in Türkiye and their evolution over time requiring future research. To gain a

deeper understanding of employment and wage dynamics, and particularly to address the potential informalization impact of a coal transition, the quantitative analysis should be supplemented by qualitative research. This forthcoming analysis should also encompass the skill/educational profile of coal workers, essential for assessing their ability to transition to other sectors and thus their prospects for new employment. This aspect is particularly pertinent given the expanding renewable energy sector's capacity to potentially absorb transitioning workers.²⁹

Learning from the transition experiences of countries like Germany and the UK and analyzing just transition strategies from countries like Spain and South Africa is crucial. A systematic review of successful practices can inform future research agendas, setting a foundation for evidence-based policymaking in support of a just transition.



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The Istanbul Policy Center–Sabancı University–Stiftung Mercator Initiative aims to strengthen the academic, political, and social ties between Turkey and Germany as well as Turkey and Europe. The Initiative is based on the premise that the acquisition of knowledge and the exchange of people and ideas are preconditions for meeting the challenges of an increasingly globalized world in the 21st century. The Initiative focuses on two areas of cooperation, EU/ German-Turkish relations and climate change, which are of essential importance for the future of Turkey and Germany within a larger European and global context.

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