

Just transition lessons from coal-dependent regions: A comparative analysis of Newcastle, Australia and Zonguldak, Türkiye*

Ayşenur Demir

Bogazici University, Faculty of Managerial Sciences, Istanbul, Türkiye

e-mail: ayсенur.demir@std.bogazici.edu.tr

ORCID: 0009-0008-2040-0577

Sevil Acar

Bogazici University, Faculty of Managerial Sciences, Istanbul, Türkiye

e-mail: sevil.acar@bogazici.edu.tr

ORCID No: 0000-0001-5535-8673

Abstract

The objective of this research is to study the ongoing transition of Newcastle, Australia, from a mining-oriented to a sustainable and diversified economy in order to draw insights to address comparable issues in Zonguldak, Türkiye. The paper analyzes the strategies and initiatives that led to Newcastle's success and recommends implementing the best practices in Zonguldak. The unique challenges faced by Zonguldak due to its specific socio-economic and geographical context are closely examined. The study identifies several practices that can be implemented in the region and suggests policy interventions and strategies to achieve a sustainable economic transition. These strategies include implementing carbon pricing, leveraging Zonguldak's mining heritage to promote tourism, engaging with the community, fostering collaboration between government agencies and private sector entities, and adopting just transition frameworks. The research findings are valuable for policymakers, local communities, and stakeholders seeking to establish resilient, diversified economies in mining-dependent regions.

Key words: Coal exit, just transition, low-carbon transition, mining-dependent regions, sustainable development.

JEL codes: D63, O13, Q32, Q52.

* Submitted/Geliş: 05.05.2024, Accepted/Kabul: 25.06.2025

1. Introduction

The issue of climate change has garnered significant global attention since the early 19th century. The international community is running out of time to limit temperature increase to below 2 degrees Celsius by 2100, as postulated by the Paris Agreement. Transitioning to low-carbon alternatives is how we can achieve the most significant leap, as it involves a shift away from conventional fossil fuels, the largest contributor to carbon emissions, and towards renewable energy sources. Although many countries have expressed a desire to adopt renewable technologies, progress towards a low-carbon transition has been inconsistent. Coal is a widely accessible and economically feasible source of energy, globally ranked second in terms of usage (Shahzad & Aruga, 2023). However, its continued reliance hinders efforts towards a successful transition to renewable energy sources.

Against this backdrop, the present study examines how Newcastle has diversified its economy, moving from mining to a more sustainable model. The objective is to draw insights from Newcastle's experience and apply them to address comparable issues in Zonguldak, Türkiye, another significant coal-producing city. The intention is to offer meaningful recommendations that can aid other mining-reliant areas in cultivating a stable and versatile economy.

Newcastle and Zonguldak, chosen as focal points for this comparative study, present a compelling contrast in terms of population, surface area, population density, and climate contributing to their unique physical characteristics. While Newcastle, nestled in the Hunter Region of New South Wales, Australia, boasts a population of approximately 171,528 spreads over an expansive 3,304 km², Zonguldak province, located in the north-west Black Sea region of Türkiye, accommodates a significantly larger population of 588,510 within a more confined area of 1,628 km². This discrepancy results in distinct population densities, with Newcastle featuring a lower density due to its vast land area compared to Zonguldak. The climatic differences are also pronounced, with Newcastle experiencing defined seasons marked by snowy winters and mild summers, in contrast to Zonguldak's marine west coast climate characterized by mild temperatures and heavy precipitation during winters. These variations in population, surface area, population density, and climate underscore the diverse physical attributes of each region, reflecting their geographic and environmental distinctions.

Despite the geographical differences between Newcastle and Zonguldak, their shared historical legacy and profound dependence on coal mining make them compelling for this study. The coal industry has played a pivotal role in shaping the identity, economy, and culture of both cities, rendering them compelling subjects for exploration. This justification is evident in the historical significance of coal mining in both regions, the population's reliance on mining activities, and the

pervasive identification of the entire city with the characteristics of the mining industry.

The central focus of the study is to understand how an economic transition from coal dependence to a more diversified and sustainable economy can be effectively managed in coal-reliant regions, with the goal of informing policies that promote economic resilience and sustainability in similar post-coal cities. To this end, Section 2 undertakes a comprehensive literature review, Section 3 explains background information and methodology, Section 4 presents the case studies of Newcastle and Zonguldak, Section 5 discusses the results, and finally, Section 6 concludes.

2. Literature review

The literature review serves as a crucial component, offering a broader context that enhances the understanding of the challenges and opportunities faced by mining-dependent regions. For the purposes of this study, the literature is categorized into three main themes: historical economic dependence on mining activities and the challenges accompanying the transition; global comparative studies offering valuable insights for other mining communities worldwide; and, finally, policy frameworks / suggestions to facilitate a just transition for all members of society. Within each theme, the review primarily explores studies from the last decade to examine the latest research findings, identify knowledge gaps, and assess the applicability of strategies across diverse contexts. Recognizing the rapid pace of technological advancements, policy shifts, and global priorities, this timeframe limitation ensures the relevance and applicability of the literature to the current discourse.

2.1. Mining-related literature

While acknowledging the extensive body of literature on green / clean energy transitions, this study intentionally narrows its focus to the substantial challenges posed by coal, recognized as the most environmentally detrimental fossil fuel. The decision to concentrate on coal is motivated by its profound environmental impact and the pressing need for sustainable alternatives. Acknowledging the wealth of research in the broader field of green energy transitions, the study seeks to examine two cities that share a mining heritage, elucidating their experiences in transitioning to more diverse and sustainable economies. Thus, a thorough literature review provides a comprehensive understanding of the historical economic dependence on mining activities in both Newcastle and Zonguldak. This review encompasses studies, reports, and scholarly articles that shed light on the challenges and

opportunities associated with transitioning away from mining-dependent economies.

Throughout history, mining has served as a valuable source of income for countless communities. However, the impact of mining and its lasting legacy on these communities is multifaceted, particularly as the industry undergoes economic challenges and transformations. Despite this, many individuals take pride in the rich history and heritage of mining, and leaders in finance and policy strive to shift away from the old-fashioned "black industrial persona" often associated with industry. The Northeast region of the United States emerges as a global leader in coal mining museums and heritage innovation despite facing policies at the regional and national levels that do not prioritize the conservation of industrial heritage (Vall, 2017). This highlights the importance of establishing a cultural framework for the "end of coal" and recognizing the accomplishments and sacrifices of those who worked in the mines.

Building upon a similar conceptual foundation, Üstün and Cizreli (2021) explore the potential consequences of a post-coal era in cities that heavily rely on coal, explicitly focusing on Zonguldak. This city's economy and culture are deeply rooted in coal mining, which possesses the highest share in employment within the city's total employment. The study examines how this reliance impacts public opinion, revealing a widespread feeling of nostalgia among Zonguldak residents due to the city's rich history in coal mining. The study emphasizes the importance of developing alternative economic and cultural institutions to maintain the city's current socio-cultural structure if one wants to challenge the status quo.

Işın (2011) also investigates the future of aging industrial landmarks in cities undergoing deindustrialization due to coal mining, specifically focusing on the coal washery area and its structures in Zonguldak City. This city has a monolithic economic foundation heavily reliant on coal mining, making it a prime example for analysis. Işın's (2011) research examines the transformation of these industrial landmarks in deindustrializing coal mining cities and their role in shaping urban identity within the broader Turkish national context. The study also analyzes the impact of massive labor layoffs and early retirement policies, which contribute to escalating unemployment, prolonged unemployment scenarios, dwindling household income, reduced purchasing power, a surge in outward migration, and a reduction in population size and growth rate. These economic and demographic effects are crucial outcomes of deindustrialization in coal mining regions.

In a parallel narrative, Newcastle, Australia, where residents maintain a profound cultural connection with coal mining, becomes the focal point of Chatterjee and Dupre (2019). Their research illuminates how industrial cities such as Newcastle have successfully reimagined their identity and harnessed tourism as

a potent promotional tool. The preservation of heritage in these areas has proven to be a strategic advantage, demonstrating how old industrial sites can be repurposed in exciting new ways. This study offers a blueprint for developing tourism strategies that celebrate mining heritage in cities that once relied heavily on this industry.

In a similar vein, Syafrini, Nurdin, Sugandi, and Miko (2021) explore the remarkable transformation of Sawahlunto, Indonesia, from a coal mining city to a thriving cultural hub for mining heritage tourism. Their work highlights the tireless efforts of local stakeholders to prevent the city from becoming a "ghost town" after the collapse of the coal mining industry. Within just 15 years, Sawahlunto has experienced a dramatic resurgence that stands out among other mining cities. This rejuvenation was carefully planned, with community actors collaborating to revitalize the cityscape and transform damaged mining sites into compelling tourist destinations.

2.2. Global comparative studies

Moving on to the second theme of global comparative studies, it is noteworthy to highlight Rentier, Lelieveldt, and Kramer's (2018) research on coal-fired power phase-out processes in Europe. This study sheds light on the unique obstacles nations encounter when combining extensive coal usage for power generation with a rich history of coal mining. The research compares the trajectories of coal mining and coal-fired electricity generation in Germany, Spain, Poland, and the UK from 1990 to 2015. The study's results provide compelling evidence for the impact of institutional effects, arguing that the UK's liberal market economy facilitated a relatively swift phase-out of coal mining and usage, in contrast to a more hesitant transition in the other three countries.

Schiffer and Trüby's (2018) analysis of the German energy transition provides insights into the Middle East and North Africa. Despite the 'Energiewende,' one of the world's most ambitious programs to decarbonize an entire national energy system through substantial renewable energy deployment, Germany has faced challenges in achieving significant carbon dioxide (CO₂) emission reductions. The paper highlights the importance of cost considerations beyond the power sector for the sustained success of the 'Energiewende,' offering policy suggestions and exploring what lessons the Middle East and North Africa can derive from the German experience. It is crucial to note that this current study seeks to build on these findings, recognizing and applying lessons learned to offer valuable insights for policymakers in various countries facing similar challenges.

Similarly, Chen et al. (2019) compare the energy transition experiences of Germany and China, aiming to identify commonalities and propose recommendations. The primary objective was to identify commonalities and provide

recommendations to facilitate successful local and global energy transitions. The study emphasizes the significance of strategic international cooperation, advocating for collaboration across various domains, including political, economic, scientific, and public arenas. Despite differences between energy transition characteristics in Germany and China, the research emphasizes the benefits of collaborative efforts to enhance energy dialogues, deepen energy transitions, and promote green energy growth in third countries.

Diluiso et al. (2021) also present a critical perspective, asserting that the predominant evidence has disproportionately focused on coal transitions in the United Kingdom, the United States, and Germany, neglecting nations undergoing significant coal declines. This highlights the necessity for research investigating the political economy of potential or fundamental coal transitions in low- and middle-income countries and those presently heavily invested in coal—an essential focus of the present paper, designed to address a notable gap in the literature.

2.3. Just transition frameworks

Although some important stages such as the Kyoto Protocol signed in 1997 and the 2015 Paris Climate Agreement are important to draw the framework of the fight against the climate crisis, policies related to the issue of mitigating the negative social, cultural, and economic effects that the measures to be taken against the climate crisis will create in the short and medium terms have more recently been considered. More specifically, such policies came to the fore with the acknowledgement of the "Just Transition" concept. Just Transition focuses on protecting individuals who are economically, socially, and culturally affected by low-carbon transitions and coal exits, providing material and moral support, and employing them in new employment areas within the scope of "decent jobs". A just transition needs to be planned and implemented consistently at national, regional and local scales in order to both protect the parties (individuals, households, communities) affected by the economic and social transformation as a result of the actions taken against the climate crisis, and to make the transformation fair and sustainable.

Green and Gambhir (2019) explore the benefits and challenges of decarbonizing the global economy. They focus on "transitional assistance policies" and strategies that can help mitigate potential losses for consumers, workers, businesses, and vulnerable communities. The study highlights the importance of these policies and encourages government intervention to support equitable transitions.

The research conducted by García-García, Carpintero, and Buendía (2020) suggests that while transitioning to a sustainable energy mix, it is essential to focus

on regional-level studies and national-level research. This approach is crucial in addressing the unequal effects of the transition. The study reveals a gap in the existing research, highlighting the scarcity of studies that examine income dynamics. It also points out that research on labor often overlooks crucial aspects such as the effects of the transition on job quality, changes in working hours, and gender-related impacts. These topics require attention and should be included in academic discourse.

Diverging from more expansive research endeavors and circling back to the literature pertinent to the current study, Evan and Phelan's (2016) paper stands out. This study examines two local-scale initiatives in the Hunter Valley, New South Wales, Australia, shedding light on transition strategies toward a post-carbon society. These initiatives challenge the dominance of fossil fuel interests influenced by ecological, social, and economic factors across various scales, from local to global. The paper advocates for the successful integration of just transition and environmental justice, emphasizing the necessity of community engagement and participation across all sectors.

The research conducted by Üstün and Cizreli (2023) shares similarities with the current study in examining the difficulties faced by Turkish communities in moving away from coal dependence. The study posits that a fair transition can alter residents' perceptions of coal mining. The authors suggest that incorporating environmental awareness training alongside equitable transition measures can mitigate biases and unfavorable attitudes associated with phasing out coal, paving the way for a successful transition.

The shared focus on transitioning from a coal-dependent economy to a greener alternative form is a common thread across these studies. Each endeavor delves into the complexities of navigating this transition, aiming to contribute insights that can inform effective strategies and policies. While acknowledging the similarities, the current study seeks to extend and build upon the groundwork laid by the previous research. The aim is to advance the knowledge base in this critical field by adopting a comparative lens and to deepen our understanding of the complexities of achieving a sustainable and diversified economy post-coal.

3. Background information and methodology

The comparative analysis in this study employs a multifaceted approach to evaluate the gradual transition experience of Newcastle as the primary objective is to discern the crucial strategies implemented by Newcastle to enable progress, and to see which one worked and which one did not. The following sections discuss the

methodology and data collection process employed to address the research objectives.

3.1. Method

To conduct a thorough analysis of the transition to cleaner energy sources in the Newcastle region, a holistic study is employed, taking into account various factors. The first phase of the analysis focuses on economic variables. Publicly available data is utilized to evaluate the region's overall economic performance during the transition, with changes in employment figures, particularly in the mining industry, being tracked. The study also evaluates industrial diversification and the growth of other and/or new sectors to determine economic shifts.

The study then moves on to environmental variables, investigating whether there has been a noticeable reduction in carbon emissions as a result of the transition to cleaner energy sources and assessing any increase in the capacity and utilization of renewable energy sources.

In terms of socio-cultural indicators, the study measures the level of community involvement in decision-making processes throughout the planning and implementation stages of the transition. The collaboration between government agencies, private sectors, and local communities are also thoroughly researched. Additionally, the establishment of museums, cultural centers, or other initiatives that aim to preserve and showcase the region's cultural heritage are explored. This exploration seeks to determine the viability of such initiatives as potential recommendations for the Zonguldak area. This multifaceted approach ensures a comprehensive examination of various facets, encompassing economic, environmental, and socio-cultural dimensions, contributing to a thorough and nuanced understanding of the transition's impact.

3.2. Data

The methodology and data employed in this study are anchored in a robust and multi-faceted approach, drawing information from authoritative sources such as the Australian Bureau of Statistics, Turkish Statistical Institute (TURKSTAT), academic databases, and relevant news articles to ensure a comprehensive and up-to-date dataset. The tables and graphs presented throughout the study are crafted by the authors based on these primary data sources to provide a clear visualization of critical trends and patterns. Given the reliance on national databases, the data are considered to be inherently reliable and reflect a high degree of accuracy. This comprehensive dataset not only establishes a solid foundation for the study but also

contributes to the credibility and validity of the insights derived from the collected data.

4. Case study analysis

4.1. Newcastle's legacy of coal and its transition strategies

Newcastle, with its roots deeply embedded in coal mining since the early 19th century, stands as a testament to the transformative impact of the coal industry. The city's prominence was intricately tied to coal extraction, establishing itself as a global coal export hub. The historical narrative of Newcastle is intertwined with coal mining, influencing the city's architecture, traditions, and community spirit.

Coal mining began in Newcastle in the early 1800s. Within ten years of the First Fleet arriving at Sydney Cove in 1788, coal was discovered near Newcastle and to the south and west of the settlement. Initially, the colony of New South Wales strictly used coal as a means of heating and cooking, and having no other use for it, they started trading it for other items they needed. However, over the 19th century, Newcastle became the most crucial coal port in the southern hemisphere, exporting coal to Asia, South America, New Zealand, and other Pacific nations. Most of it was sent to other Australian cities, particularly Sydney. This significant demand for coal transformed the region, and dozens of underground mines were dug across the area, with a web of railway lines built to carry the coal to the harbor (Bevan, 2022).

Hunter Valley, which is known for its central city, Newcastle, its wineries, and its coal mines, is often portrayed as the "vital economic engine room" of the Hunter and the broader New South Wales economy (Heber, 2013). As per the Port of Newcastle Economic Impact Report 2016/17, coal mining contributed \$13 billion to New South Wales' total gross regional product in 2015/16, with \$7.8 billion coming from the Hunter region alone. The coal mining industry also generated around 51,000 full-time jobs, of which 36,000 were in the Hunter region. The port activity and coal industry in the Hunter Valley contributed \$9.4 billion to the region's economy and \$15.0 billion to the New South Wales economy. The report further suggests that by increasing the Port's existing cargoes to 204 million tons, the Lower Hunter alone could boost 10,000 full-time jobs by 2020/21.

Mining has played a vital role in the economic development of New South Wales for over two centuries, providing jobs and income to the people of the state. The New South Wales Minerals Council, the leading industry association representing the state's minerals industry, affirms this statement. From its convict origins, mining has become a strategically significant industry in New South Wales, supporting thousands of jobs and generating economic activity, taxes, and royalties

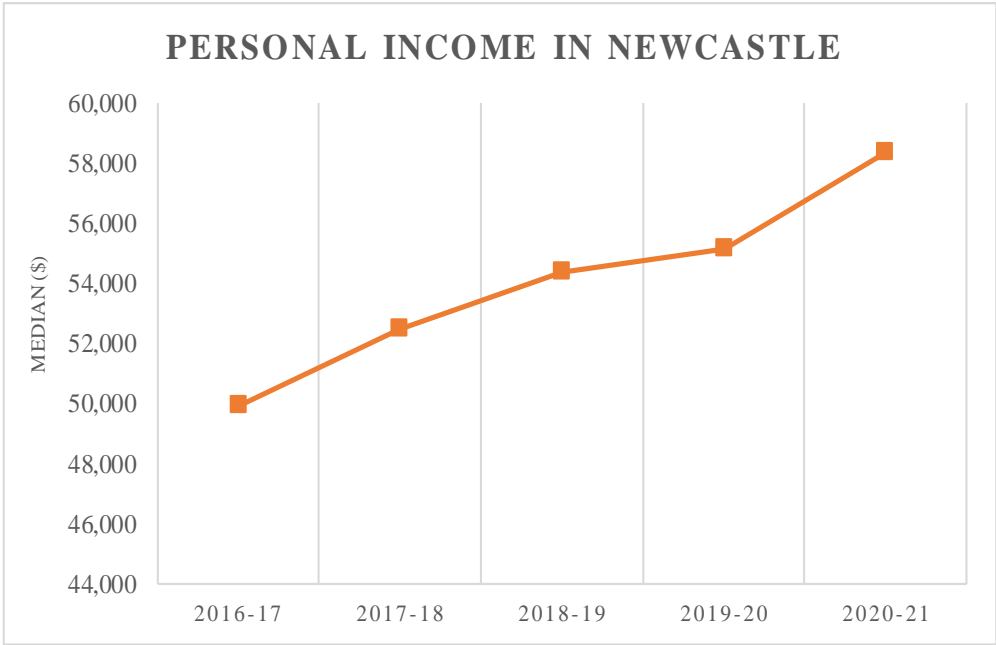
that support the development of government infrastructure and essential services such as schools, hospitals, and police.

According to the New South Wales Minerals Council's 2021 annual member company Expenditure Survey, the 27 participating mining companies directly injected \$14.9 billion into the New South Wales economy in 2019-2020, supporting tens of thousands of livelihoods. The Australasian Institute of Mining and Metallurgy (AusIMM) reports that mining in New South Wales offers 40,000 jobs across the state, provides almost \$2 billion worth of royalties to the state government, and Newcastle exports 160 million tons of coking coal per year, making it the world's largest coal export port.

As of 2021, Australia had 14 percent of the world's coal reserves (black and brown), ranking third behind the United States (23 percent) and Russia (15 percent) (BP, 2022). Regarding black coal, Australia is thought to hold about 10 percent of the world's economic resources (Hughes et al., 2023).

This robust coal sector has historically played a crucial role in Newcastle's economic landscape; however, as evident by the numbers showcasing a stable personal income environment throughout the transition in Newcastle, it suggests that the city has successfully navigated the challenges posed by the changing dynamics. By the late 20th century, local coal mines began to close due to economic pressures and shifts toward alternative energy sources and industries. Moreover, several mines such as Mount Arthur Coal Mine and Glencore Mine ceased their operations or closed down in 2020, aligning with broader trends toward energy diversification and environmental considerations. Figure 1 illustrates personal income levels in Newcastle from 2016-17 to 2020-21, which demonstrate an upward trend. The figure further demonstrates that the transition away from coal does not inevitably lead to economic losses for a region. Needless to say, further data on post-mine closures is essential to comprehensively assess trends in personal income. However, the current analysis relies solely on Census data, which was most recently conducted in 2021.

Figure 1



Source: Authors’ illustration based on data obtained from the Australian Bureau of Statistics.

The trend depicted in Figure 1 suggests a broader narrative beyond the upward trend in personal income. First, it highlights the critical role of demographic changes in mitigating the economic risks associated with mine closures. As the local economy transitioned away from coal mining, Newcastle experienced shifts in its demographic profile. This included an increase in population (CityPopulation.de (n.d.)) attributable to broader urbanization trends and economic diversification, which likely attracted professionals and workers in sectors such as education, healthcare, and technology (Southward, 2019). This shift likely contributed to supporting local businesses, thereby cushioning the impact of coal-related employment losses.

Second, the share of employment losses in total coal mining employment due to mine closures provides valuable insight into the region’s adaptation. While the closure of key mines like Mount Arthur Coal Mine and Glencore Mine in 2020 marked significant losses in coal-related jobs, these did not translate into widespread economic decline. This outcome underscores the effectiveness of targeted policy

measures and community initiatives in transitioning displaced workers into alternative employment sectors, including renewable energy, construction, and technology industries.

Finally, the role of strategic investments in other economic sectors cannot be undermined. The city's efforts to stimulate growth in areas such as education, healthcare, and renewable energy appear instrumental in stabilizing income levels (Southward, 2019). For instance, increased investment in infrastructure and green projects not only generated jobs but also positioned Newcastle as a hub for future-oriented industries. These investments align with broader trends in global energy diversification and environmental sustainability, making Newcastle's transition a potential model for other coal-reliant regions.

The 2023 Australian Bureau of Statistics findings, covering the entire nation rather than solely focusing on the Newcastle region, highlight a sustained decline in the mining gross operating surplus, contracting by 1.5% due to weakened demand. This contraction is particularly evident in private non-financial corporations, experiencing a significant decrease of 4.5% as profits within the mining industry continue to diminish. Despite these challenges, there is an overall positive trend in total employment, witnessing an increase of 462,000 individuals (3.9%). The most significant growth occurred in the professional, scientific, and technical services industry, contributing an impressive 90,000 jobs (7.5%), followed by the healthcare and social assistance industry, which added an additional 84,000 positions (5.8%). The rental, hiring, and real estate services industry, along with the wholesale trade industry, can also be identified as sectors where the economic shift occurs.

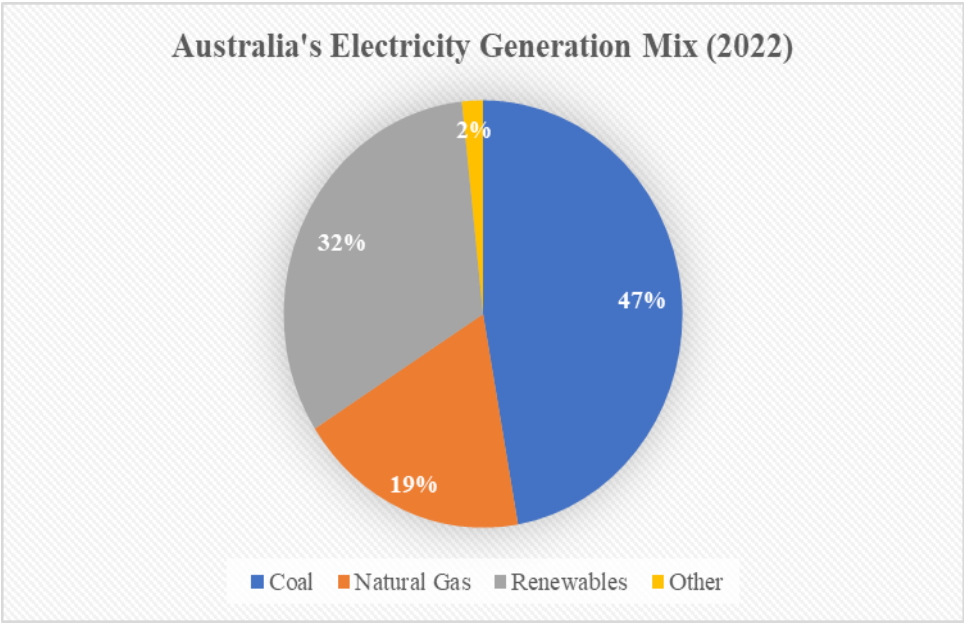
Throughout the planning and implementation stages of the energy transition, a series of impactful measures have been undertaken to enhance community involvement and foster collaboration among government agencies, private sectors, and local communities. The issuance of First Nations guidelines by the Minister for Energy is a noteworthy step, promoting genuine consultation with First Nations communities and prioritizing increased employment and income opportunities for these communities. Additionally, region-specific guidelines, such as the Central-West Orana guideline released in March 2023, tailor the approach to each community's unique characteristics, ensuring inclusivity and addressing community-specific needs and concerns. The Strategic Benefits Payment Scheme (SBP Scheme), introduced in October 2022, offers incentives for private landowners hosting new transmission infrastructure within Renewable Energy Zones (REZ) and other specified projects, aligning economic benefits with the host communities. Initiatives embedded in the guidelines and schemes actively create community employment opportunities, recognizing the importance of community members participating both economically and in decision-making processes. The emphasis on

robust communication channels and consultation mechanisms ensures that communities remain informed about transition plans, enabling them to contribute feedback and be part of the decision-making process. The SBP Scheme guarantees that private landowners not only receive compensation but also participate in the long-term benefits of energy projects, fostering a collaborative approach. The government's commitment to supporting households facing financial challenges in paying electricity and gas bills through Energy Social Programs (ESP) showcases a social safety net prioritizing community welfare. The implementation of temporary caps on the price of coal for power stations, as part of the Energy Price Relief Plan, reflects a measure to mitigate the economic impact on communities. Overall, these initiatives collectively underscore a commitment to inclusive decision-making, economic development, and social support, forming a collaborative framework for a successful and community-centric energy transition (Montoya, 2023). When the overarching plan of the Australian government, aiming to phase out all New South Wales coal-fired power stations by 2030, materializes, it will thus be a consequence of a substantial reform program being executed at both national, regional, and community levels. This underscores the imperative for undertaking a profound and inclusive commitment to change when navigating the transition towards a low-carbon energy mix.

By addressing demographic changes, re-skilling displaced workers, and investing in alternative economic sectors, Newcastle has mitigated the risks associated with coal mine closures. However, these trends also raise questions about potential disparities among different demographic groups and the sustainability of such transitions in the long term. Addressing these aspects in future research could enhance the understanding of regional resilience in the face of economic transformation.

Regrettably, on the other hand, upon examination of the 2022 Australian electricity generation source mix, coal remains the predominant contributor (Figure 2). This situation raises concerns about the progress toward a more sustainable and diverse energy mix in the whole of Australia.

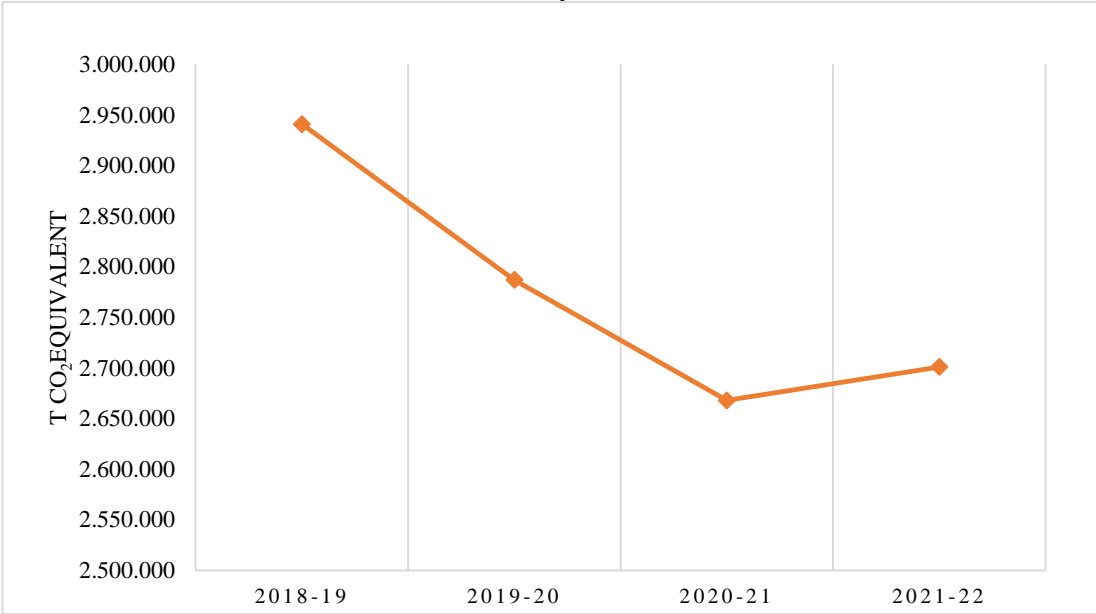
Figure 2



Source: Authors' illustration based on data obtained from the Australian Bureau of Statistics.

On a less optimistic note, the indicators for monitoring quantifiable changes in emission levels paint a discouraging picture. The municipal emissions data for Newcastle fails to show a noteworthy or consistent decrease in greenhouse gas emissions (GHG emissions in tons of CO₂equivalent), with only a minor decline attributable to the COVID-19 pandemic rebounding promptly. This could be linked to the absence of a comprehensive coal phase-out. For a detailed overview of Newcastle's municipal emissions, see Figure 3.

Figure 3
Newcastle Municipal Emissions



Source: Data gathered through Snapshot, which is a tool offering GHG emission profiles at the municipal, Federal Electorate, and state levels in Australia.

4.2. The situation in Zonguldak and Türkiye in general

Similarly, Zonguldak's historical narrative, as a province in Türkiye, is inextricably intertwined with coal mining, a tradition dating back to the Ottoman era. Commercial extraction began in the 1840s under Ottoman rule, evolving rapidly with the establishment of modern mining infrastructure in the early 20th century. With the establishment of the Republic, mining activities in the basin accelerated and investments in the region increased significantly. The coal mining industry in Zonguldak has played a pivotal role in the region's economic and social development since the mid-19th century. The city's development has been significantly influenced by coal extraction, representing Türkiye's rich mining heritage. The mining industry has not only spurred economic growth but has also become a fundamental aspect of the local identity, fostering a strong sense of pride and community among residents (Üstün and Cizreli, 2021). Alongside coal-based industrial facilities, the province saw the development of collective living areas such

as workers' and civil servants' housing estates, as well as educational institutions, commercial centers, and social and sports facilities. This fostered a distinctive local culture centered around mining. Furthermore, technical personnel trained in mining within Zonguldak not only contributed to the advancement of the industry locally but also played a crucial role nationwide by leading the establishment and growth of mining across Türkiye (Zonguldak Coal Geopark Project, n.d.).

Throughout the 20th century, Zonguldak became Turkey's primary coal supplier, supporting industrialization and energy needs nationwide (Acar and Kızılkaya, 2021). Turkey's most significant known hard coal field is located in Zonguldak. The hard coal produced within the borders of Zonguldak province is used in coke production at iron and steel factories as well as in thermal power plants (MTA, n.d.). However, fluctuating global energy markets, environmental concerns, and economic restructuring have led to gradual mine closures and employment shifts since the late 20th century (Zonguldak Coal Geopark Project, n.d.). When examining the share of coal employment in a province's total employment, Zonguldak still emerges as the province with the highest proportion of employment in coal relative to its total employment (Social Security Institution [SGK], 2020). Considering that coal enterprises under the general directorate of TTK are dispersed in the wider region, mining-related employment is concentrated not only in the province of Zonguldak, but also in Bartın, Karabük, and Kastamonu.

Understanding this historical trajectory is essential for contextualizing contemporary economic transitions in Zonguldak and informing comparative analyses with other coal-dependent regions such as Newcastle.

Türkiye's coal resources are primarily managed by Turkish Hard Coal Enterprises (TTK) and Turkish Coal Enterprises (TKİ), both government-owned corporations. In recent years, TKİ and TTK have leased coal reserves to private companies, and numerous private mines are now operational. Although all coal deposits are state-owned, over half of the mining activities in Türkiye are conducted by the private sector, as reported by the Global Methane Project in 2020. TTK and its subsidiaries play a substantial role in coal production in Zonguldak.

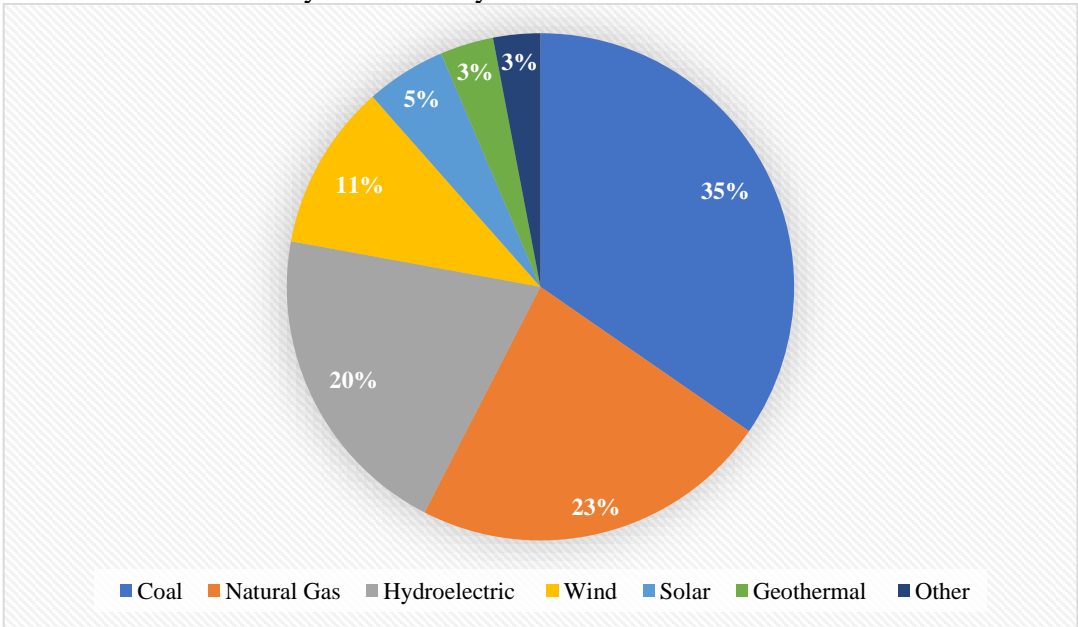
The ÇATES facility in Zonguldak, operational since 1989, boasting a capacity of 314 MW, relies on burning domestic hard coal. While its recommended phase-out date is 2028, its production license is valid until 2063. On the other hand, the ZETES complex, operational since 2010 with a substantial capacity of 2,790 MW, utilizes imported hard coal. Although a phase-out is recommended between 2023-2027 (ZETES-1 in 2023, ZETES-2 in 2026, and ZETES-3 in 2027), its production license extends until 2053 (Global Methane Project, 2020).

With their life expectancy still far away in the future, it is not likely that the country will give up on coal production anytime soon, as the industry remains

deeply ingrained in the economic and energy landscape, posing complex challenges for a swift transition to alternative sources.

In the context of Türkiye, as per Acar and Yeldan (2016) and Uğurtaş (2022), it has yet to establish a definitive objective of fully phasing out coal. Rather, the emphasis has been on reducing import reliance through heightened domestic coal production. The government has placed significant emphasis on introducing a roadmap to renovate and revamp thermal plants to enhance coal efficiency (Daily Sabah, 2017). With Türkiye's escalating economic activity and population expansion, energy demand is also on the rise, making fossil fuels likely choices in fulfilling these energy needs from the viewpoint of the Ministry of Energy and Natural Resources (Bayraktar, 2020). Despite the increasing importance of renewable energy sources, coal remains a primary source for electricity production (Figure 4).

Figure 4
Türkiye's Electricity Generation Mix in 2022



Source: The Turkish Ministry of Energy and Natural Resources.

On the other side of the coin, coal prices are volatile due to the geopolitical developments in the international era (such as the announcement of the European Green Deal, the Russian-Ukrainian war, etc.), which may force Türkiye to consider abandoning this energy source. Carbon border adjustments, which price emissions from production processes while exporting to the European Union (EU), could lead to significant additional costs for Türkiye, especially since about half of Türkiye's exports go to EU countries. Turkish coal is facing various economic challenges such as high production costs, labor intensity, and poor competitiveness, which have become more evident as coal generation declined for the third consecutive year in 2021. Türkiye's coal generation decreased by 8% from 2018 to 2021, even compared to 2020 when five lignite plants were shut down for six months due to non-compliance with new air pollution limits. Despite this, coal generation is still at its highest level of the pre-2018 period (Alparslan, 2022).

Despite the attempts to accelerate domestic coal production and the substantial subsidies to support coal mining, the share of the value added by hard coal and lignite mining in Gross Domestic Product (GDP) has shown a declining trend from 2003 to 2022 (Acar and Kızılkaya, 2024). It is also worth noting that coal-based jobs make up only a small fraction of Türkiye's employment landscape, and that number has been on a downward trend in recent years. A 2021 analysis by CAN Europe (Acar and Kızılkaya, 2021) found that registered employment in coal mining, as reported by the Social Security Institution (SGK), dropped from around 50,000 in 2008 to approximately 35,000 in 2019, and has continued to decline since 2013. Data from the Turkish Statistical Institute (TURKSTAT) also evidences a similar decline, with employment in the sector falling from over 50,000 in 2014 to around 40,000 in 2020. Additionally, the sector's share of total employment is minimal and has been decreasing, from 0.21% in 2014 to 0.16% in 2020 (Nas Özen and Aşık, 2023).

Although coal mining is a significant industry in some of Türkiye's provinces, such as Zonguldak, Muğla, Kahramanmaraş, Manisa, and Çanakkale, it does not rank among the top 10 industries with the highest employment rates. Interestingly, miners in this sector have comparable levels of education to those in other industries, and around 66% of them are aged between 25 and 44, suggesting that they could potentially transition to other sectors (Nas Özen and Aşık, 2023). This highlights the possibility of a fair transition away from coal, which could even lead to improved living conditions for employees under the right conditions. Additionally, the low added value of coal production, its declining trend, and the decreasing number of ventures in the sector indicate its limited contribution to GDP, which stands at approximately 1%. Even in Zonguldak, which has the highest share of coal employment, the coal mining sector only constitutes 4% to 6% of jobs (Nas Özen and Aşık, 2023).

There is no reason why Zonguldak's economy cannot achieve the same economic resilience as Newcastle's alongside a coal exit process by implementing specific preventative measures. Besides, sectors such as rental, hiring, real estate services, tourism (especially cultural and industrial heritage tourism) and wholesale trade hold potential for development in Zonguldak, especially with well-planned, region-wide re-skilling and up-skilling initiatives.

5. Discussion and policy recommendations

Australia and Türkiye have contrasting strategies for coal phase-out and different climate targets. Despite being a major coal exporter, Australia has been criticized for its slow coal phase-out, and its policies often emphasize economic dependence on coal exports while gradually increasing investment in renewable energy (Climate Action Tracker, 2025). In contrast, Türkiye, although less dependent on coal exports, has adopted policies that prioritize energy security and domestic coal use, while slowly integrating renewable energy into its energy mix. Both countries have committed to net-zero emissions targets—Australia by 2050, Türkiye by 2053 under the Paris Agreement—but their approaches differ in speed and focus, with Australia emphasizing export-oriented policies and Turkey emphasizing domestic resource use and a gradual transition to renewable energy (Bayraktar, 2020). Yet, the current policies of both countries are deemed "insufficient" when compared to modeled domestic pathways (Climate Action Tracker, 2025). This highlights the need for significant enhancements in both Australia's and Türkiye's climate policies and actions by 2030 to align with the goal of limiting global warming to 1.5°C. (As of 2025, Türkiye's policies are rated as "critically insufficient" by Climate Action Tracker.)

This section aims to provide specific social and policy recommendations for Türkiye, considering the current context to extract valuable insights for the benefit of the global and local communities. The recommendations are in response to Newcastle's ongoing green energy transition, with the overarching goal of assimilating advantageous implementations, best practices, and knowledge while also avoiding the same mistakes. While the energy transition creates new possibilities and development opportunities, an unplanned transition carries the risk of leaving behind economies and regions, particularly those dependent on fossil fuels.

The first step for any region or mine-dependent area is to set a bold target date for phasing out existing coal and abstaining from building any new coal power plants in the meantime. It is also crucial to conduct healthcare and environmental impact assessments, as well as cost and benefit analyses, to make well-informed decisions.

After taking the first step, the next crucial step to successfully phase out coal is to have high-level government support. Government officials should provide clear and consistent guidance on the need for reforms. Currently, Australia is facing a challenge in this regard, as the major political parties do not have a unified stance on climate and energy policies. Some officials support a complete phase-out of coal, while others believe that coal depletion is necessary for national energy security. However, there are other countries that have already phased out coal without compromising energy security or competitiveness (Tagliapietra, 2017). In Australia, the situation is changing rapidly due to increasing market and investor pressure on coal businesses, as well as the 2019 bushfires and the 2021 Glasgow COP, which have shifted public opinion towards the need for a transition plan. Despite some positive developments, progress is challenging and dependent on various factors. Nonetheless, Australia is already witnessing a transition away from coal, and other regions can benefit from the current policy recommendations to facilitate an effective transition.

Once a clear commitment is made by the government to transition from coal mining to cleaner industries, a variety of social, economic, and environmental policies need to be put in place. These policies are discussed in the following section. The first policy recommendation is to provide financial support, early retirement opportunities for miners, welfare allowance, and even relocation. It is important to develop transition plans through open dialogue with mining communities, municipalities, civil society organizations, and local businesses. To make energy sector planning more efficient, experts and the general public should be allowed to participate. This can help achieve transition goals faster and foster engagement with the community, empowering them in the process.

One of the biggest concerns for governments is that phasing out coal could lead to a significant decrease in employment. This is an important factor in their decision to delay coal phase-out initiatives. Workers in the coal industry are also worried about their future prospects. Therefore, it is crucial to ensure that former miners can stay in the workforce. Re-training the current coal workforce is essential, which requires a strategic focus on helping them integrate into the changing job market. National re-skilling and up-skilling programs are necessary to redirect these individuals towards environmentally sustainable jobs, especially in emerging sectors such as renewable energy. Encouraging the development of new industries and creating employment opportunities in renewable energy or other low-carbon sectors can also provide significant support to states that rely heavily on coal. This recommendation also calls for comprehensive profiling and guidance for the existing workforce, the establishment of alternative measures for different employee profiles, and the provision of viable options for all those involved.

Carbon pricing is a method that governments and businesses can use to translate GHG emissions into a financial cost. This tool can help reduce emissions and achieve climate goals. In Australia, a carbon pricing scheme was introduced in 2012 as the Clean Energy Act. Upon its introduction, emissions from companies subject to the scheme decreased by 7% (Taylor, 2014). However, because the then Opposition leader Tony Abbott indicated his intention to repeal the carbon tax, very few investments in emissions reductions were made. Subsequently, the scheme was repealed in 2014 and was replaced with the Emission Reduction Fund. All in all, emissions resumed their growth (Jericho, 2019). As of 2021, GHG emissions, which made up 39% of national GHG emissions, were not covered by any carbon pricing instrument in Australia (OECD, 2022). As for Türkiye, it does not currently levy an explicit carbon price other than engaging in an implicit form of carbon pricing in the form of fuel excise taxes, which cover only 29.9% of emissions (OECD, 2022).

The preservation and showcasing of the cultural heritage of mining-dependent regions through museums, cultural centers, and other initiatives is also crucial. While it may be tempting to move beyond the "old black industrial image," it is critical to maintain aspects of cultural identity and reverence for the community's longstanding heritage. This can be achieved by transforming industrial and cultural elements into valuable assets. This not only capitalizes on the rich history of coal-dependent regions but also provides an opportunity to mitigate their potential adverse effects on the environment. Establishing a cultural framework for the "end of coal" is essential, as well as acknowledging the achievements and sacrifices of the miners. Such recognition can help provide the necessary closure for those affected. In the Zonguldak area, where tourism offerings are limited, this cultural initiative has the potential to stimulate local interest and enthusiasm for the conclusion of the coal phase. Despite the existence of a mining museum, there are untapped opportunities to enhance its appeal and create additional avenues for visitor engagement, which can contribute to the broader economic revitalization of the region. During the periods when elements of industrial heritage were actively operational, they developed interactions and functional relationships on a broader scale, collectively shaping the city's industrial identity through their integration. Although there are examples of facilities that have undergone adaptive reuse for public purposes (e.g. for touristic visits, for the services of Bülent Ecevit University, etc.), Fidan and Önür (2021) criticize the fact that generally a singular approach to preservation has been adopted in Zonguldak, lacking the implementation of an integrated preservation and revitalization strategy. There are academic proposals for the region that identify and document the building stock in the region's industrial heritage and evaluates it in terms of their preservation, integration into tourism, and place in urban memory (see, for instance, Kalay and Bölükbaşı Ertürk, 2024).

Within the context of Türkiye, it is also highly recommended to stop offering incentives to coal-based sectors and instead use the resulting budget to promote clean sectors in the coal-dependent regions. Currently, there are various direct transfers, tax easements and employment incentives provided for coal-based sectors. These incentives include income tax withholding support under Temporary Article 80 of the Income Tax Law and two different incentives that introduce income tax exemptions for mining operations. The total amount of these incentives, defined in the Income Tax Law Articles 23/3 and 23/9, was expected to add up to 86 million TL in 2021. On the other hand, studies suggest that, in the absence of these incentives, a significant decline on GHG emissions (5% decline with respect to the business-as-usual GHG level in 2030) without a substantial reduction in GDP (0.5% decline with respect to the business-as-usual GDP level in 2030) is possible (Acar and Yeldan, 2016). Thus, the most critical task now is to ensure effective and efficient spending of this national budget funds for Türkiye's energy transition (Acar and Yeldan, 2016; Acar et al., 2018).

During the transition period, collaboration between government agencies and private sector entities can be a valuable building block to support the above-mentioned policies. In Australia, there is a noticeable shift in the rhetoric of energy and resource companies. These firms are increasingly recognizing climate and sustainability concerns among investors and workers, as reported by the Sydney Environment Institute (2022). For example, Glencore has announced its plans to close down its Liddell, Integra, and Newlands mines in New South Wales' Hunter Valley due to investor pressure. This pressure is catalyzing change in both the power and mining sectors. The private sector will be a critical partner in delivering practical development cooperation on environmental issues in countries. For private sector engagement to drive lasting positive ecological change, it needs to promote sound business models for environmental protection that deliver environmental outcomes, are financially feasible, and create decent jobs. It is good to see that Australia has taken steps towards this, and we hope that other countries will follow suit.

Another important takeaway from the Australian experience is the significance of transparency and scientific evaluation when it comes to reporting electricity sector emissions. This involves releasing details about emissions from major combustion plants, like coal power plants, to the public and submitting data to pertinent databases for impartial research and analysis. Additionally, providing statistics on the health of the population and cases of respiratory illnesses at the local level is crucial. This will foster trust between the government and community members and instill a sense of unity in the war against coal.

It is also crucial to prioritize the adoption of just transition frameworks to ensure the well-being of all individuals. However, it is worth noting that Türkiye has yet to implement any just transition policy. As for Australia, the three primary coal-mining states, namely New South Wales, Queensland, and Victoria, hold differing opinions on the matter. While unions, investors, and industry players are discussing just transition, the government has remained less involved. It is important to acknowledge here that the term "just transition" can be problematic in Australia, as it can often cause feelings of being threatened instead of included, specifically among workers and communities in the coal mining sector (Sydney Environment Institute, 2022).

One potential solution to this issue is to create a task force that can address two critical aspects. Firstly, negative impacts on workers and the communities affected by the transition would be carefully assessed and mitigated. Secondly, the most crucial stakeholders would be involved in developing recommendations. Academic literature suggests that just transition work primarily focuses on four areas: workers, justice thinking, planning, and empowerment (Sydney Environment Institute, 2022). This initiative holds the potential to address all four of them.

Clearly, a comprehensive approach to just transition requires careful consideration of the unique needs and concerns of all parties involved. It is also important to have a nuanced understanding of justice principles, meticulous planning, and the empowerment of communities to foster sustainable transitions. This holistic perspective emphasizes the interdisciplinary nature of transition initiatives and highlights the importance of addressing economic, social, and environmental dimensions simultaneously.

6. Conclusion

Newcastle and Zonguldak, two cities with a rich history of coal mining, have developed a unique cultural identity based on their coal-producing past. Coal mining has played a pivotal role in their growth and development, providing employment opportunities and attracting government subsidies to build and maintain the cities' infrastructure.

On the one hand, Newcastle has associations dedicated to researching and preserving the history of coal mining, which reflects the importance of the industry to the city's identity. On the other hand, the people of Zonguldak, despite environmental concerns, remain committed to preserving their coal mining heritage and the opportunities it has provided. Although efforts have been made to reduce the environmental impact of mining, it continues to be a vital part of the city's economy.

Coal mining has shaped the heritage of these cities and their respective regions, and it is crucial to balance the preservation of their cultural significance with the responsible management of their environmental impact. Accurately recording the history of these activities is essential for future generations of mining historians and the public to learn from. However, ecological responsibility must be prioritized, and awareness must be raised. We cannot overlook the environmental sensitivities associated with mining operations. We must find a way to maintain the legacy of coal mining while safeguarding the environment. Achieving this balance will ensure that future generations can appreciate the cultural significance of these sites without compromising the earth.

In conclusion, the experiences of Newcastle and Zonguldak are not isolated instances but hold relevance for cities worldwide grappling with similar transitions. The insights from their journeys provide a valuable lens to understand the challenges and opportunities inherent in transitioning from coal dependence. By contextualizing their experiences within the global narrative of sustainable development, this study seeks to contribute actionable knowledge for policymakers, urban planners, and researchers addressing the urgent need for sustainable and diversified economies.

The current study provides insights into the coal-based histories of Newcastle and Zonguldak, but it is important to note its limitations. Since the study only examined these two regions, the findings may not be applicable to other areas. Additionally, the complexity of the data, particularly related to environmental impact and community attitudes, presented challenges during analysis. Further research is necessary to fully comprehend the cultural and social factors that affect heritage preservation and transition acceptance. To expand the study's impact, future work should involve conducting comparative case studies on a global scale, utilizing longitudinal analyses, employing qualitative research methods, and evaluating policy implications.

Conflict of Interest Statement: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding: This research was supported by the Scientific and Technological Research Council of Türkiye (TUBITAK) under Grant Number 123K509.

Statement of publication ethics: The authors declare that the study has no unethical issues and that research and publication ethics have been observed carefully.

Author Contribution Rates: First author 50%, second author 50%.

(If Necessary) Ethics Committee Approval: Not applicable.

Acknowledgements: This study was supported by the Scientific and Technological Research Council of Türkiye (TUBITAK) under Grant Number 123K509. The authors thank TUBITAK for their support. We also acknowledge the constructive comments from the above-mentioned project group, as well as the participants of the Just Transition in the Global South Workshop (held on 16–17 May 2024 in Bristol), on a previous version of this study.

References

- ACAR, S. and KIZILKAYA, S. (2021), “Türkiye’de Kömüre Dayalı İstihdamın ve Ekonominin Analizi”, *CAN Europe*. https://caneurope.org/content/uploads/2021/06/Komure-Dayali-Istihdam-ve-Ekonomi_CAN-Europe.pdf
- ACAR, S. and KIZILKAYA, S. (2024), “The Role of Coal in the Turkish Economy”, *Türkiye Enerji Araştırması*, TURKISHTIME and EYODER. <https://turkishtimedergi.com/enerji/turkiye-ekonomisinde-komurun-yeri/>
- ACAR, S., CHALLE, S., CHRISTOPOULOS, S., and CHRISTO, G. (2018), “Fossil fuel subsidies as a lose-lose: Fiscal and environmental burdens in Turkey”, *New Perspectives on Turkey*, 58, 93–124.
- ACAR, S. and YELDAN, A. E. (2016), “Environmental impacts of coal subsidies in Turkey: A general equilibrium analysis”, *Energy Policy*, 90, 1–15.
- ALPARSLAN, U. (2022), “Turkey Electricity Review 2022”. <https://ember-energy.org/app/uploads/2024/09/Turkey-Electricity-Review-2022.pdf>
- AUSTRALIAN BUREAU OF STATISTICS. (2023), “Personal Income in Australia”, *Australian Bureau of Statistics*. Released on June 12, 2023.
- BAYRAKTAR, A. (2020), “A Multidimensional Analysis of Turkish-German Low Carbon Energy Transitions”, *Thesis*, Middle East Technical University, Graduate School of Natural and Applied Sciences.
- BEVAN, M. (2022), “There was once a 'darkness' buried under Newcastle. The legacy of coal has defined the city ever since”, *ABC News*, March 14. <https://www.abc.net.au/news/2022-03-15/legacy-of-coal-newcastle-dream-time/100897652>

- BLAKKARLY, J. (2016), “Can a Tiny Australian Coal Town Reinvent Itself? Life Beyond Coal”, *Earth Island Journal*, 31 (3), 40–45. <http://www.jstor.org/stable/44133576>
- BP. (2022), *Statistical Review of World Energy 2022*, 71st edition. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pdf>
- CHATTERJEE, R. and DUPRE, K. (2019), “Exploring Newcastle’s Potential as an Industrial Heritage Tourism Destination”, *Journal of Tourismology*, 5. <https://doi.org/10.26650/jot.2019.5.1.0017>
- CHEN, C., XUE, B., CAI, G., THOMAS, H. and STÜCKRAD, S. (2019), “Comparing the energy transitions in Germany and China: Synergies and recommendations”, *Energy Reports*, 5, 1249–1260. <https://doi.org/10.1016/j.egyr.2019.08.087>
- CITYPOPULATION.DE. (n.d.), “Newcastle (City, Australia) – Population Statistics, Charts, Map and Location”. Retrieved June 11, 2025, from Australian Bureau of Statistics estimates 2001–2021.
- CLIMATE ACTION TRACKER. (2025), “Countries”, *Climate Action Tracker*. <https://climateactiontracker.org/countries/>
- CLIMATE COUNCIL. (2022), “Where Do Australia’s Major Parties Stand on Climate Action? Australian Political Party Platform Analysis – 2022 Federal Election”. <https://www.climatecouncil.org.au/resources/australias-major-parties-climate-action-policy-2022/>
- DAILY SABAH. (2017), “Turkey to make full use of domestic coal to minimize imports”, *Daily Sabah*, November 7. <https://www.dailysabah.com/energy/2017/11/07/turkey-to-make-full-use-of-domestic-coal-to-minimize-imports>
- DEPARTMENT OF CLIMATE CHANGE, ENERGY, THE ENVIRONMENT AND WATER. (n.d.), “Australian electricity generation - fuel mix”, *Energy.gov.au*. <https://www.energy.gov.au/energy-data/australian-energy-statistics/data-charts/australian-electricity-generation-fuel-mix>
- DILUISO, F., WALK, P., MANYCH, N., CERUTTI, N., CHIPIGA, V., WORKMAN, A., AYAS, C., CUI, R., CUI, D., SONG, K., BANISCH, L., MORETTI, N., CALLAGHAN, M., CLARKE, L., CREUTZIG, F., HILAIRE, J., JOTZO, F., KALKUHL, M., LAMB, W. and MINX, J. (2021), “Coal transitions – Part 1: A systematic map and review of case study learnings from regional, national, and local coal phase-out experiences”, *Environmental Research Letters*, 16, 113003. <https://doi.org/10.1088/1748-9326/ac1b58>
- EVANS, G. (2007), “A just transition from coal to renewable energy in the Hunter Valley of New South Wales, Australia”, *International Journal of Environment, Workplace, and Employment*, (3). <https://doi.org/10.1504/IJEWE.2007.019278>
- EVANS, G. and PHELAN, L. (2016), “Transition to a post-carbon society: Linking environmental justice and transition discourses”, *Energy Policy*, 99, 329–339. <https://doi.org/10.1016/j.enpol.2016.05.003>
- FIDAN, F. and ÖNÜR, S. (2021), “Analysis of The Industrial Heritage in Zonguldak and Recommendations for Its Reutilization”, *International Journal of Conservation Science*, 12 (1), 177–194.
- GARCÍA-GARCÍA, P., CARPINTERO, Ó. and BUENDÍA, L. (2020), “Just energy transitions to low carbon economies: A review of the concept and its effects on labor and income”, *Energy Research & Social Science*, 70. <https://doi.org/10.1016/j.erss.2020.101664>

- GREEN, F. and GAMBHIR, A. (2019), "Transitional assistance policies for just, equitable, and smooth low-carbon transitions: Who, what, and how?", *Climate Policy*, 1–20. doi:10.1080/14693062.2019.1657379
- GLOBAL METHANE PROJECT. (2020), *Coal overview: Türkiye*, https://www.globalmethane.org/documents/toolsres_coal_overview_ch33_updated2020.pdf
- HEBER, J. (2013, April 2), "Mining has a positive impact on the Hunter economy: KPMG", *Australian Mining*, <https://www.australianmining.com.au/mining-has-a-positive-impact-on-the-hunter-economy-kpmg/>
- HUGHES, A., BRITT, A., PHEENEY, J., SUMMERFIELD, D., SENIOR, A., HITCHMAN, A., CROSS, A., SEXTON, M., COLCLOUGH, H., AND HILL, J. (2023), "Australia's Identified Mineral Resources", *Geoscience Australia, Canberra*.
- İŞİN, Ş. (2011), "What happens to old industrial landmarks in deindustrializing coal mining cities? In between emptiness and heritage preservation", *Conference Proceedings, On the Surface: The Heritage of Mines and Mining* (14–16 April 2011), CTCC, Leeds Metropolitan University.
- JERICHO, G. (2019, February 28), "Australia's annual greenhouse gas emissions", *Datawrapper*. Archived version: January 17, 2020.
- KALAY, G. and BÖLÜKBAŞI ERTÜRK, A. E. (2024), "A proposal about preserving the industrial heritage of Zonguldak province Kandilli region and introducing it to tourism", *Journal of Humanities and Tourism Research*, 14 (2), 146–165.
- MONTROYA, D. (2023), "The energy transition: Decarbonisation, decentralisation and digitalisation", Research Paper No. 2023-08, *The New South Wales Parliamentary Research Service*.
- MADEN TETKİK VE ARAMA GENEL MÜDÜRLÜĞÜ (MTA). (n.d.), *İl Maden Potansiyelleri*, <https://www.mta.gov.tr/v3.0/bilgi-merkezi/il-maden-potansiyelleri>
- NAS ÖZEN, E. and AŞIK, G. (2023), "Kömüre Dayalı İstihdamdan Çıkış: Sorun Alanları ve Çözüm Önerileri", prepared for CAN Europe and SĖFiA.
- OECD. (2022), "Pricing Greenhouse Gas Emissions: Key Findings for Australia", <https://www.oecd.org/tax/tax-policy/carbon-pricing-australia.pdf>
- OECD. (2022), "Pricing Greenhouse Gas Emissions: Key Findings for Türkiye", <https://www.oecd.org/tax/tax-policy/carbon-pricing-turkiye.pdf>
- RENTIER, G., LELIEVELDT, H., and KRAMER, G. (2018), "Varieties of coal-fired power phase-out across Europe", *Concept Paper*, 1. doi:10.13140/RG.2.2.28501.68321
- SCHIFFER, H., and TRÜBY, J. (2018), "A review of the German energy transition: taking stock, looking ahead, and drawing conclusions for the Middle East and North Africa", *Energy Transitions*, 2. doi:10.1007/s41825-018-0010-2
- SGK. (2020), *İstatistik Yıllıkları*, http://www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari
- SHAHZAD, Q. and ARUGA, K. (2023), "Does the Environmental Kuznets Curve hold for coal consumption? Evidence from South and East Asian countries", *Sustainability*, 15 (6), 5532. <https://doi.org/10.3390/su15065532>
- SOUTHWARD, J. (2019), "Newcastle prepares for a post coal future", *Australian Institute of Company Directors*, <https://www.aicd.com.au/risk-management/framework/plan/newcastle-otr.html>
- SYAFRINI, D., NURDIN, M. F., SUGANDI, Y. S., and MIKO, A. (2021), "Transformation of a coal mining city into a cultured mining heritage tourism city in Sawahlunto, Indonesia: A response to the threat of becoming a ghost town", *Tourism Planning & Development*. <https://doi.org/10.1080/21568316.2020.1866653>

- SYDNEY ENVIRONMENT INSTITUTE. (2022, April), “Towards a Just Transition from Coal in Australia?”
- TAGLIAPIETRA, S. (2017), “Beyond Coal: Facilitating the Transition in Europe”, *Bruegel*, <https://www.jstor.org/stable/resrep28616>
- TAYLOR, L. (2014, March 7), “Carbon-taxed companies cut emissions by 7% in the past year, investor group says”, *The Guardian*.
- TURKISH MINISTRY OF ENERGY AND NATURAL RESOURCES. (n.d.), *Elektrik*, <https://enerji.gov.tr/bilgi-merkezi-enerji-elektrik>
- UĞURTAŞ, S. (2022), “Türkiye balks at coal phaseout amid growing energy woes”, *Al-Monitor*, <https://www.al-monitor.com/originals/2022/03/Türkiye-balks-coal-phaseout-amid-growing-energy-woes>
- ÜSTÜN, A. and CİZRELİ, B. (2021), “Perception of the possible post-coal period in coal-dependent cities: Zonguldak example in Turkey”, *Ankara Üniversitesi Çevre Bilimleri Dergisi*, 8 (2), 46–57.
- ÜSTÜN, A. and CİZRELİ, B. (2023), “The coal phase-out policy and the just transition in coal-dependent settlements”, *ODÜ Sosyal Bilimler Araştırmaları Dergisi (ODÜSOBİAD)*, 13, 3541–3554. doi:10.48146/odusobiad.1207364
- VALL, N. (2017), “Coal is our strife: Representing mining heritage in Northeast England”, *Contemporary British History*, 32, 1–20. doi:10.1080/13619462.2017.1408541

Özet

Kömüre bağımlı bölgelerden adil geçiş dersleri: Avustralya’nın Newcastle şehri ve Türkiye’nin Zonguldak ili üzerine karşılaştırmalı bir analiz

Bu çalışma, Avustralya’nın Newcastle kentinin madencilğe dayalı ekonomik yapısından sürdürülebilir ve çeşitlendirilmiş bir ekonomiye geçiş sürecini inceleyerek, benzer bir dönüşüm süreciyle karşı karşıya olan Türkiye’nin Zonguldak ili için yol gösterici bilgiler sunmayı amaçlamaktadır. Newcastle’ın bu dönüşümde elde ettiği başarının ardındaki strateji ve uygulamalar analiz edilirken, Zonguldak’ın özgün koşullarına uyarlanabilecek en iyi örneklerin belirlenmesine odaklanılmış; ilin sosyo-ekonomik ve coğrafi yapısından kaynaklanan zorluklar ayrıntılı biçimde ele alınmıştır. Bu analizler doğrultusunda, bölgeye özgü uygulanabilir yaklaşımlar geliştirilmiş ve sürdürülebilir bir iktisadi dönüşüm için çeşitli politika önerileri sunulmuştur. Öne çıkan stratejiler arasında ülke çapında karbon fiyatlandırma mekanizmalarının uygulanması, Zonguldak’ın madencilik mirasının turizme kazandırılması, yerel halkın sürece etkin katılımının sağlanması, kamu ve özel sektör arasında iş birliğinin güçlendirilmesi ve adil geçiş ilkelerinin benimsenmesi yer almaktadır. Elde edilen bulgular, madencilğe bağımlı bölgelerde dirençli ve çeşitlendirilmiş bir ekonomik yapı kurmayı hedefleyen politika yapıcılar, yerel topluluklar ve diğer paydaşlar için önemli bir kaynak sunmaktadır.

Anahtar kelimeler: kömürden çıkış, adil geçiş, düşük karbonlu dönüşüm, kömüre bağımlı bölgeler, sürdürülebilir kalkınma.

JEL kodları: D63, O13, Q32, Q52.