

FOUR PAPERS THAT MAY HAVE USE VALUE

Below are recent papers discovered while developing a monograph on coal in the 21st Century. Hopefully, they prompt thinking and you find them useful.

INDIRECT EMPLOYMENT

Source: Jan Frankowski, Joanna Mazurkiewicz, Jakub Sokołowski, “Mapping the indirect employment of hard coal mining: A case study of Upper Silesia, Poland,” *Resources Policy*, 83 (2023); <https://doi.org/10.1016/j.resourpol.2023.103693>.

ABSTRACT

It is insufficient to simply calculate the number of jobs in the mining industry to determine the labour market effects of a coal phase-out. In this paper, we estimate the scale of indirect jobs in Europe’s largest hard coal mining region, Upper Silesia and categorise them as mining-related or mining-dependent. Additionally, we provide a detailed overview of the structure and spatial distribution of mining-related companies, utilising information from public tenders offered by five of the country’s largest coal enterprises, as well as financial and employment data from official administrative repositories. Our observations have revealed a significant agglomeration effect in the region, with companies located within 20 km of the nearest active hard coal mine receiving 80% of all tender revenues. Furthermore, we have found that 41% of all identified jobs in mining-dependent companies in Upper Silesia are at high risk of liquidation if there is a decline in coal production. Finally, we argue in favour of labour market mitigation policies tailored explicitly to mining-dependent employees and suggest the widespread use of administrative data in just transition planning to address the limitations of dominant top-down modelling approaches.

COAL AS PRECURSOR FOR GRAPHENE PRODUCTION

Source: Cesar Franco, Alejandra S. Lozano-Perez, Nestor E. Mendieta-Reyes, Carlos A. Guerrero-Fajardo, "Graphene oxide obtention via liquid phase exfoliation from high-rank coal: A comparison of mineral matter removal by alkaline bath," *MethodsX*, Volume 10, 2023; <https://doi.org/10.1016/j.mex.2023.102147>.

ABSTRACT

Colombia is one of the world's leading exporters of coal and coke, with significant reserves of high-quality coal. Most of the coal exported from Colombia is used for power generation, but there is also a class of coal that is suitable for making coke. Coke is a raw material required for making steel, and it is produced by heating coal to high temperatures in the absence of air. Colombia is the third-largest global exporter of coke, with a significant portion of its exports going to the steel industry in countries such as Brazil, Mexico, and the United States. The country's high-quality coal reserves and proximity to major markets make it an important player in the global coal and coke trade. On the other hand, graphene and its derivative Graphene Oxide (GO) have unique properties that make them suitable for a wide range of commercial applications. Graphene has exceptional mechanical strength and high electrical conductivity, which make it an attractive material for a variety of electronic and structural applications. For example, graphene-based materials are being developed for use in flexible electronic devices, sensors, and high-strength composites. GO, on the other hand, is highly resistive but still retains exceptional mechanical strength. This makes it useful in applications where electrical conductivity is not necessary but mechanical strength and durability are important. Graphene production using current techniques can be expensive and inefficient, which limits its widespread adoption for commercial applications. However, new production methods, such as Liquid Phase Exfoliation (LPE), are being developed to address these challenges. LPE is a method for producing graphene and graphene oxide that involves using a liquid solvent to break apart graphite into individual graphene sheets. This method is more efficient and cost-effective than traditional methods such as mechanical exfoliation and chemical vapor deposition. In recent years, there has been increasing interest in using high-rank coal from Colombia as a raw material for graphene production using LPE. This is because high-rank coal from Colombia is known to have a high carbon content and low impurity levels, which makes it an ideal raw material for graphene production. Researchers have successfully produced GO using the LPE method and high-rank coal from Boavita, Colombia. This has the potential to significantly increase the supply of graphene and graphene oxide, making it more accessible for commercial applications. Additionally, using coal as a raw material for graphene production has the potential to create a new market for coal, which could benefit the Colombian economy. In order to synthesize GO, it is important to establish a suitable protocol for the grinding procedure and particle size selection. (i. more than 0.15 mm, ii. 0.15 mm to 0.05 mm, and iii. less than 0.05 mm) were defined. To compare the yield, the mineral matter

removal procedure was carried out with a basic leaching bath. Coal oxidation was performed using the modified Hummers process, and GO was then obtained using LPE. This method has the following advantages: It is feasible to produce GO from high-rank coal with acceptable quality and particulate size smaller than 0.15 mm, yields that are close to 5%, and flakes with fewer than 15 layers.

RENEWABLES JOBS FOR DISPLACED COAL WORKERS

Source: Max Vanatta, Michael T. Craig, Bhavesh Rathod, Julian Florez, Issac Bromley-Dulfano, Dylan Smith, "The costs of replacing coal plant jobs with local instead of distant wind and solar jobs across the United States," *iScience*, Volume 25, Issue 8, 19 August 2022; <https://doi.org/10.1016/j.isci.2022.104817>.

ABSTRACT

To further a just energy transition, jobs lost at retiring coal plants could be replaced by jobs at wind and solar plants. No research quantifies the feasibility and costs of such an undertaking across the United States. Complicating such an undertaking are workers' place-based preferences that could prevent them from moving long distances, e.g. to high renewable resource regions. We formulate a bottom-up optimization model to quantify the technical feasibility and costs of replacing coal plant jobs with local versus distant jobs in the renewables sector. For the contiguous United States, we find replacing coal generation and employment with local wind and solar investments is feasible. Siting renewables local to instead of distant from retiring coal plants increases replacement costs by 5%–33% across sub-national regions and by \$83 billion, or 24%, across the United States. These costs are modest relative to overall energy transition costs.

PLACE ATTACHMENT AND COAL TRANSITIONS

Source: Lochner Marais, John R. Owen, Tina Kotze, Peetrus Nel, Jan Cloete, Molefi Lenka, "Determinants of place attachment among mineworkers: Evidence from South Africa," *The Extractive Industries and Society*, 8 (2021)

ABSTRACT

The authors argue that, given (i) the unpredictability of the mining lifecycle and (ii) global pressure to transition out of coal, researchers must take a more critical perspective on place attachment and its consequences. Research generally depicts place attachment in a positive light. The conventional understanding is that place attachment brings stability, creates assets and helps society to take on and complete long-term projects. We use evidence from case studies to question the

appropriateness of this conventional wisdom and whether it should be applied blindly in the mining industry. A policy of encouraging place attachment will be counterproductive if living standards and access to quality service provision cannot be maintained. Unchecked, place attachments can create financial lock-ins that lead to long-term economic damage. The likelihood of eventual mine closure means that policies that aim to induce place attachment to encourage stability, long-range planning and asset development may not be appropriate for all mining communities. While we agree that some measure of place attachment should be encouraged through social policy throughout the mine's lifecycle, we do not agree that place attachment should be constructed as an outcome in its own right.