

# Renewable empowerment – gender-inclusive climate policies for more jobs for women and girls

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## Overview

Fighting climate change through mitigation and adaptation has the potential to save millions of livelihoods and create new opportunities and jobs in many economic sectors. However, current trends indicate that the transition to renewable energy and green jobs has not yet significantly increased the participation of women and girls in these sectors. Despite the growing demand for skilled workers in green economic activities, the energy transition risks perpetuating existing structural gender imbalances unless governments and decision makers make deliberate efforts to enhance inclusion and diversity (IRENA 2019). Female labor force participation is persistently lower at 50% globally, compared to 80% for men (WDI, 2024). Women face barriers entering the labor market, such as limited access to education and training, and unequal access to resources like financing and land. Additionally, workplace discrimination, caregiving responsibilities, mobility restrictions and unsafe transport, as well as policy shortfalls, like no parental leave and childcare, hinder women's economic opportunities. These challenges are compounded in emerging industries like renewable energy, where traditional gender roles often limit women's inclusion. Addressing these barriers is crucial not only for equity but also for unlocking the full potential employment in driving sustainable development and economic growth. Women perform over three-quarters of unpaid care work, primarily for children and increasingly for elderly family members (WDI, 2024). High childcare costs deter mothers from working, especially in developed countries, while lack of policies and facilities restricts workforce participation in developing nations. In India, for instance, 44.5% of women remain out of work due to inaccessible childcare services and safety concerns. This paper proposes a gender-inclusive climate policy package, including investments in renewable energy, resilient infrastructure, and a global carbon tax of \$80 per ton of CO<sub>2</sub>. Carbon tax revenues would fund expanded childcare and early childhood education. Country-specific regressions assess the impact of increased childcare spending on female labor force participation, with results integrated into a macroeconometric model comparing employment outcomes by gender, education, and sector against a baseline scenario.

## Methods and data

The Model of Innovation in Dynamic Low-Carbon Structural Economic and Employment Transformations, MINDSET, with price-endogenous technology employed for the simulations combines the strengths of Input Output (IO) analysis with responses to exogenous price changes. The IO approach yields short to midterm economic responses to exogenous demand changes, and accounts for all multiplier effects from intermediate demands along the value chains in a consistent framework. Connecting countries globally by bilateral trade extends the framework to capture trade effects from (intermediate and final) demand changes in one country on its trading partners, and their trading partners. Combining it with the Leontief price model allows for changes in the intermediate and final demands as a reaction to exogenous price changes. The global carbon price is administered, and revenues are used to improve childcare and early childhood education. Labor demand enters the picture via two channels: investment yields additional demands and hence additional labor demand. The carbon tax shifts economic activities away from carbon intensive and energy intensive activities towards more labor-intensive activities. Female workers benefit from investment in sectors which employ predominantly women and from facilitated access to the labor demand because they have more time to allocate to paid work. The elasticities between investing in childcare and early childhood education and changes in female labor force participation are estimated empirically. The results are given for 2040.

The model uses data MRIO data from the Global Resource Input-Output Assessment (GLORIA) database, a multi-regional input-output database that was built by the University of Sydney using the IELab infrastructure for the UN International Resource Panel (UN IRP). GLORIA has 164 regions, 120 sectors each, supply-use transactions T, final demand y, value added v in 5 valuations (basic prices, trade margins, transport margins, taxes on products, subsidies on products) and a continuous time series for 1990-2027. (Lenzen et al. 2017, Lenzen et al. 2021). ). The model extends the dataset, with an MRIO-like matrices of fuel and emission flows, based on IEA, UNSD and EDGAR data (IEA, 2023; UNSD, 2024; Crippa et al., 2023). For the estimate of elasticities, we use data on Government expenditure on childcare and early childhood education (<https://countryeconomy.com/government/expenditure>). The scenarios are

applied to ten countries (Bangladesh, Ivory Coast, Egypt, Jordan, Poland, Turkiye, Serbia, Kenya, Indonesia, Philippines), which differ in size, income level, location and region, resource endowment and in their gender indicators. The simulations strive for the illustration of differences rather than comprehensiveness. The climate investment pathways, as well as future electricity prices are in sync with the World Bank's Country Climate Development reports (<https://live.worldbank.org/en/series/ccdr>), if available.

## Results

Revenue from the carbon tax amounts to between .5 and 1.5% of GDP. This amount can be spent additionally on childcare and early education facilities, going with equal shares into building new facilities and employing personnel. Percentage growth in the respective sector differs by country, depending on the size of the sector under baseline assumptions and the level of carbon emissions. In Bangladesh, for instance, the scenario yields 6.6% more investment and expenditure on childcare and early childhood education, while for Egypt, the top-up amounts to more than 10%. European countries, such as Serbia and Poland see lower percentages of additional spending with Serbia around 2% and Poland around 5%. In the Philippines, the scenario yields almost 11% higher expenditures on childcare and early education. Employment and GDP impacts are net positive in all countries because positive investment effects outperform negative effects from the carbon tax. The positive results are largely driven by increases in the construction sector and the public education and social services sectors. Additional labor demand happens in all sectors, from agriculture to manufacturing and services. To illustrate the potential dynamics for women, we conduct the following thought experiment. We calculate additional labor demand in all sectors (excluding construction which is least attractive for women) and compare this additional labor demand under the scenario with the additional labor supply from women freed by additional childcare provisions. Interestingly, affordable or free childcare frees enough female labor supply to fill all additional positions under this scenario. , in nearly all countries, all new non-construction jobs can be filled by female entrants, and there would still be additional openings for men. Female employment would change by half a percentage point on average, male employment would see a still positive, but close to zero percentage increase. Of course, these aggregate numbers hide skills and location mismatches and other labor market frictions. The paper will analyze skill requirements and potential matches, or mismatches, under the suggested scenario.

## Conclusions

Climate change is a looming and increasing challenge, especially for women and girls. Future policy design should integrate climate change, energy transition, and the inclusion of women and girls. The paper contributes to the discussion with a macroeconomic simulation comparing a gender-inclusive climate scenario to the business as usual case. Although rather stylized, the findings offer interesting insights in how a new double dividend for the environment and more equity can be achieved.

## References

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