Policy Brief: Macroeconomic Effects of Carbon Pricing in Mongolia

Macroeconomic Modelling of a Carbon Tax

October, 2024

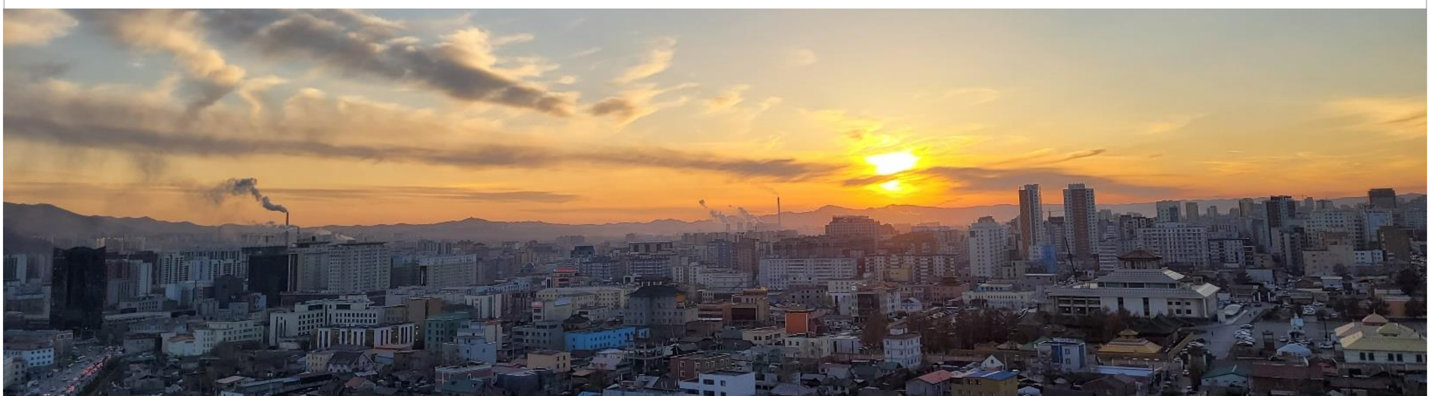

Table of contents

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for Economic Affairs and Climate Action

International Climate Initiative

on the basis of a decision by the German Bundestag

Introduction

The latest reports by the International Panel on Climate Change (IPCC 2023) confirm that the link between greenhouse gas (GHG) emissions and global warming is unequivocal. There is a broad consensus that the damage caused by climate change will increase disproportionately with rising temperatures threatening human development. To mitigate these risks, the international community agreed at the 2015 Paris Climate Summit to limit the man-made temperature increase to below 2°C, aiming for 1.5°C compared to the pre-industrial era. However, the global average temperature in 2023 has already risen by 1.2°C, so that the international community must act urgently in accordance with the principle of common but differentiated responsibilities. Despite national pledges to reduce GHG emissions including commitments of the European Union (EU) and United States of America to achieve climate neutrality by 2050, China by 2060, the International Energy Agency (IEA, 2023) currently assumes that the global average temperature will rise by 1.7°C by the end of the century if all commitments are met. Therefore, all countries are called upon to intensify their mitigation efforts and to reach net zero emissions.

According to World Bank and ADB (2021) **Mongolia already experienced climate change of warming of over 2°C** and reduced rainfall until 2015 compared to 1940, which has led to chronic drought. Expected warming will be higher than the global average. In Mongolia, GHG emissions have risen sharply in recent decades. Considering land-use change related emissions, they have increased from 23 Mt CO_2 equivalents (e) in 1990 to almost 46 Mt CO_2e in 2019, before declining a bit in 2020 during the coronavirus pandemic. But without structural changes, GHG emissions will continue to rise in the future as population and economy keep growing. Already today, annual GHG emissions per capita reach 13 tons of CO_2e, which is much above the global average. In its Nationally Determined Contribution (NDC) from 2019, Mongolia has set a reduction target of 27.2% by 2030 compared to business as usual (UNFCCC 2022). According to the baseline scenario underlying the NDC target, GHG emissions are projected to almost triple by 2030 against 1990, and still increase by factor 2.2 against the level of 2010. Reducing GHG emissions will also become economically more important in the future. For example, the EU will introduce a carbon border adjustment mechanism (CBAM) from 2026, whereby foreign companies will have to buy certificates for their GHG emissions resulting from exports to the EU.

In 2020, **agriculture and the energy sector together were responsible for 97% of GHG emissions** in Mongolia. In agriculture, enteric fermentation and direct and indirect N_2O emissions from managed soils plus emissions from biomass burning were mainly responsible for the emissions. In the energy sector, the generation of electricity and heat accounts for more than half of the emissions. In addition, the transport sector, in particular, emits greenhouse gases to a larger extent.

The generation of electricity and heat in Mongolia is currently facing structural problems with a centralized and outdated system. The production costs are currently higher than the state-fixed prices for private companies and households. From a technical point of view, a high share of combined electricity and heat production makes the system inflexible and causes avoidable and expensive losses. At the same time, the system of state-owned power plants is outdated, meaning that reforms are needed to be able to supply a growing population and economy with sufficient electricity and heat in the future. Market liberalization can help to attract finance and to induce investment. In addition, there is the necessity to replace the domestically available coal with renewable energies in the future to reduce GHG emissions and to significantly increase energy efficiency overall. Furthermore, energy generation from coal causes high air pollution, which leads to health problems. According to studies by the International Energy Agency (IEA 2024) and the International Renewable Energy Agency (IRENA 2024), renewable energies are already the cheapest (new) sources of electricity generation in many parts of the world. In the next few years, the costs of photovoltaics in particular are likely to fall further with a massive expansion, especially in China, so that this energy source will soon be the cheapest worldwide.

Carbon pricing can be a lever to modernize the Mongolian energy market. It is considered an important instrument for reducing GHG emissions following the polluter pays principle, because it makes them more expensive and alternative technologies relatively cheaper. According to the World Bank (2024), global revenues from carbon pricing reached USD 104 billion in 2023. Carbon pricing is a critical part of the policy mix needed to both meet the Paris Agreement goals and support low emissions growth (World Bank 2024). Carbon pricing is a market-based instrument that reduces GHG emissions wherever the abatement costs of carbon are lower than the carbon price. Key advantages are the long-term incentives for investment in low-carbon technologies. There are different concepts for carbon pricing such as carbon taxes or emissions trading systems (ETS) with a cap (cap and trade system). Cap and trade systems require high administrative effort and longer preparation times. Therefore, the focus is on carbon taxes in the following.

Carbon taxation generates revenues which should be used optimally, considering different options for national governments. Revenues can be used to promote energy technologies to avoid GHG emissions or to offset possible side effects. Carbon taxation can lead to unwanted effects, such as disproportionately affecting certain industries or groups in society. Policymakers need to be aware of such risks. Careful consideration is needed to ensure these are addressed in designing carbon pricing options from the beginning. Model analyses are a very suitable instrument for understanding the fundamental relationships as well as the advantages and disadvantages of specific design options.

In discussions with stakeholders in spring 2024, it was decided to analyze a carbon tax in the energy and industry sector using the e3.mn model in the project to test and better understand possible macroeconomic effects, including those of distinctive design options in the model. A key prerequisite for the effectiveness of a carbon tax is that the costs of emissions are passed through to energy prices. This requires an energy price reform in the electricity and heat sector in Mongolia to ensure this cost pass-through to end user prices.

The model e3.mn

The E3.mn model is an environmentally extended macro-econometric Input-Output (IO) model covering the structure of the Mongolian economy and its main connections to the environment, i.e. the use of energy resources and the release of related CO_2 emissions into the environment. The model is presented in detail in the model handbook (GIZ 2023a). It has been further updated and developed in the course of 2024. Similar country models have been developed and applied for other countries (see GIZ 2023b). This integrated modeling approach of the three Es, Economy, Energy, Emissions, in one model assures a consistent view of possible transition pathways in Mongolia. It enables the user to **calculate impacts for the whole economy (e.g., GDP) and single economic sectors** (e.g., employment in agriculture) as well as to draw conclusions on social balance and environmental benefits.

Figure 1 briefly shows the three model parts and their interrelations. Number 1 indicates the economic core of the E3 model, number 2 shows the energy module, which separates different energy carriers including renewables and number 3 indicates the emission module.

Each of the three parts are based on a rich and up-to-date, country-specific dataset given as time series based on annual data from 2008 until 2022 for most important economic data and from 1990 to 2021 for energy and emission data. The economic part of the model is built from an input-output table and the system of national accounts (macroeconomic data) plus population and labor market data such as employment. Energy balances, which include energy supply, transformation and (final) energy demand, are at the center of the energy part. Based on these data in physical units, combustion related GHG emissions can be directly calculated using fixed emission factors.

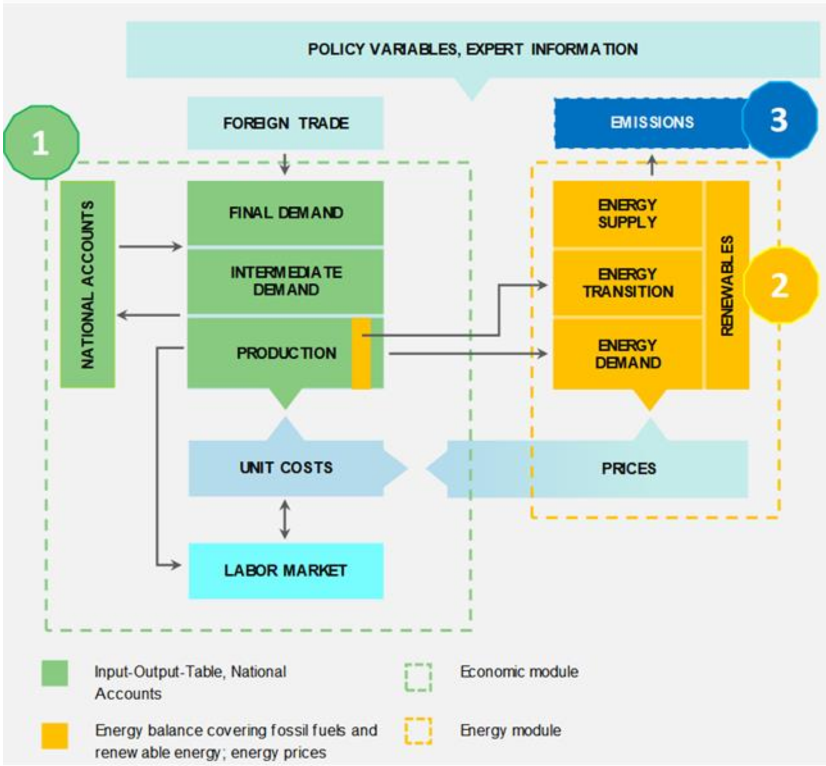

Figure 1: E3 model at a glance. Source GIZ 2023a

The E3 model for Mongolia draws on the observed and theoretical relationships represented as a set of mathematical equations which describe the mechanisms of the Mongolian economy in a simplified way. Apart from calculations given by definition such as GDP, which is the sum of consumption, investment and foreign trade, econometric methods and expert knowledge are used to derive future developments from historical data.

The model results – which depict a possible future pathway of the country's economy – depend on some exogenous inputs (e.g., population, world market prices) as well as the modelled relationships within the three model parts and between them.

Carbon Pricing Scenarios and Results

Scenario Design

To better understand the potential paths forward for climate policy in Mongolia, **two carbon tax scenarios were developed** based on stakeholder consultations. The difference in both scenarios lies in the use of the revenues from carbon taxation.

The tax base and the tax rate must be defined for the design of a carbon tax. In consultation with national stakeholders, the energy related GHG emissions from the energy sector in the production of **electricity and heat and the industry sector were selected as the tax base**. In 2020, these amounted to 11 Mt CO_2 equivalents in the energy sector and 0.3 Mt CO_2 equivalents in the industrial sector. Without structural change GHG emissions will increase in the future as the economy continues to grow unless tax revenues are used for alternatives, or the tax reduces demand for electricity and heat or for energy use in the industrial sector through higher prices. We assume an energy price elasticity of -0.2, based on international experience (Labandeira et al. 2017, Huntington et al. 2019). This means that if energy prices rise by 10% due to the carbon tax, energy demand will fall by 2%. The assumed price elasticity is therefore rather low compared to luxury goods, as electricity and heat are basic needs. People will only reduce consumption to a limited extent when prices rise.

The International Energy Agency (IEA 2021) proposes the following prices for the emerging market and developing economies: 15 USD/t CO_2 in 2030, 35 USD/t CO_2 in 2040, and 55 USD/t CO_2 in 2050. Following consultation with national stakeholders, we are using the 2040 figure as a guide but starting more slowly. The following timeline was defined for the carbon tax instrument in the energy sector and in industry for all scenarios: Carbon tax of 2 USD per t of CO_2 equivalent with gradual yearly increase of 2 USD starting from 2025 until 18

USD in 2033. Further annual increase by yearly 2.5 USD within 2034-2040 reaching 35 USD at the end. Different alternatives for the revenue recycling, i.e. the use of the carbon tax revenues, are simulated below. The results are compared in each case with the reference development of the model. All changes in the model variables can then be attributed to the carbon tax and the different assumptions on the use of revenues, each of which is briefly described below with the key results. Two carbon tax scenarios are differentiated:

	Carbon tax	**Lump sum**	**Renewables**	**Heat**	**Collateral**
Scenario 1 – **carbon tax**	Increase to 35 USD in 2040	50%	25%	25%	
Scenario 2 – **carbon tax investment leverage**	Increase to 35 USD in 2040	50%	25%	25%	Leverage of factor 5

Table 1: Carbon tax scenarios

In scenario 1, the tax will generate revenues of USD 1 billion by 2030, USD 7 billion by 2040, and USD 16.5 billion by 2050. 50% of the revenues are returned to private households as lump sum transfers. It is assumed that they will consume 100% of this lump sum payment. 25% of the revenue is also used for the expansion of renewable energy. For the costs of renewable energies, we draw on data from earlier projects in Mongolia. Accordingly, the investment costs amount to USD 1760/kW for PV and USD 2200/kW for wind energy, based on data from past projects in Mongolia. For PV, it is assumed that the investment costs will fall linearly by half by 2050. In addition, based on international sources (IRENA 2023, World Bank 2020), annual costs of 1% of the investment sum are assumed for operation and maintenance for PV and 2.1% for wind energy.

25% of the tax revenues are also invested in converting the heating supply, which is currently predominantly generated by coal in combined power and heat plants. Coal is the most carbon-intensive fossil fuel. According to a study for IRENA (2023), the heat supply in Ulaanbaatar could be completely decarbonized by 2050. Currently, private households use about 17,000 Terajoule (TJ) of heat in Mongolia according to the energy balance in 2020. The heat consumption will increase to around 20,000 TJ in 2040 in the reference scenario.

The reference scenario presents a business-as-usual development, which extrapolates relations observed in the past into the future. Structural changes and the influence of new technologies are not or only to a limited extent captured in this way. For the generation of electricity and heat, this means that additional combined heat and power plants will have to be built to supply the growing population and economy.

According to IRENA (2023) cost for decarbonized heating for Ulaanbaatar until 2050 will be USD 3.8 billion, whereby the amount of heat mentioned in the study accounts for roughly 45% of total heat consumption in the country. The entire decarbonization of the heat demand of private households could therefore cost USD 8.4 billion. We use assumptions from the Danish Energy Agency (2024) that put the cost of heat pumps, which will provide a major part of the heat supply conversion according to the study, at 1200 USD per kW/h. The study also sees the use of biofuels or burning of waste as carbon free sources to generate heat.

Scenario 2 is designed in a similar way as scenario 1 in terms of revenue recycling. However, it is assumed that 50% of the funds are used as collateral for green loans to lower interest rates (green loans include renewable energy and decarbonized heating in scenario 2). It is assumed that the investment trigger is five times the amount of the funds used. The leverage factor was agreed with national stakeholders but is of course only an estimate of what could be realistic.

Results

The results for Scenario 1 are presented below in comparison to the reference. These are net effects that arise from the various individual effects of the specific design of the carbon tax. In Scenario 1, 25% of carbon tax revenues are invested in renewable energies (wind and PV) and 25% in heat pumps. The macroeconomic effects of scenario 1 with the carbon tax with revenue recycling are positive. **GDP is 0.26% higher than in the reference in 2030, and even 0.6% higher in 2040**. Investments in renewable energies and heat in particular will be higher compared to the reference. At the same time, private households increase their spending with the lump sum revenues. Exports increase as higher coal exports are assumed (of the coal no longer used domestically). Finally, imports will also rise significantly because Mongolia will have to import almost all of the modern energy technologies. Both aspects could of course change until 2040.

The higher GDP will also be reflected in **higher employment of 0.2%** compared to the reference in 2040 and **higher gross production of 0.14%** in 2040. The carbon tax leads to higher prices at the same time. The price index of household final consumption will be 0.17% higher compared to the reference in 2030 and 0.49% in 2040. At sector level, **prices for electricity, gas and water are 13% higher** in 2040 than in the reference due to the carbon tax. In the other sectors, the price increase is between 0.1 and 1.3%. At the same time, wages are also 1.05% higher in 2040 compared to the reference. It might be interesting to use an electricity market model to check whether the expansion of PV will not have a stronger cost-reducing effect, especially in view of the necessary further expansion of coal-fired power generation in the reference. In this case, the macroeconomic effects would be more positive.

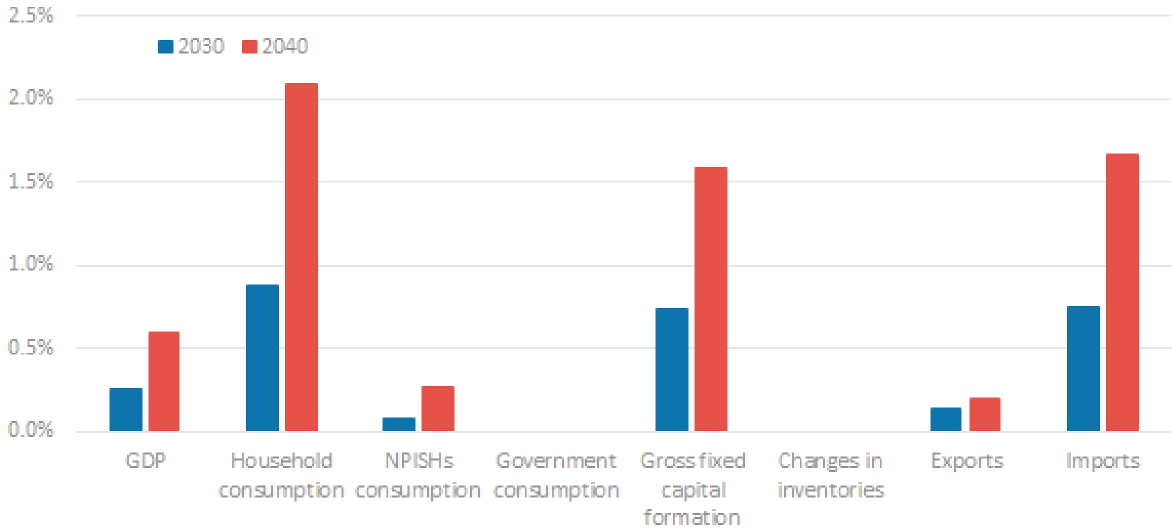

Figure 2: Impacts of Scenario 1 on GDP and components – deviations from reference in %

Figure 3 shows shifts in the final energy demand mix up to 2040. **Less coal is used** and the consumption of electricity to generate heat with heat pumps will increase by more than 3%. For electricity generation less coal is used so that energy related GHG emissions in 2040 could be 1.7 Mt CO_2 equivalents or 3.2% lower than in the reference scenario.

The contribution of a carbon tax to the NDC target can be estimated well in absolute reductions. The development in the reference is more uncertain, so that the percentage reduction of the corresponding carbon tax depends on the reference development and is subject to greater uncertainty.

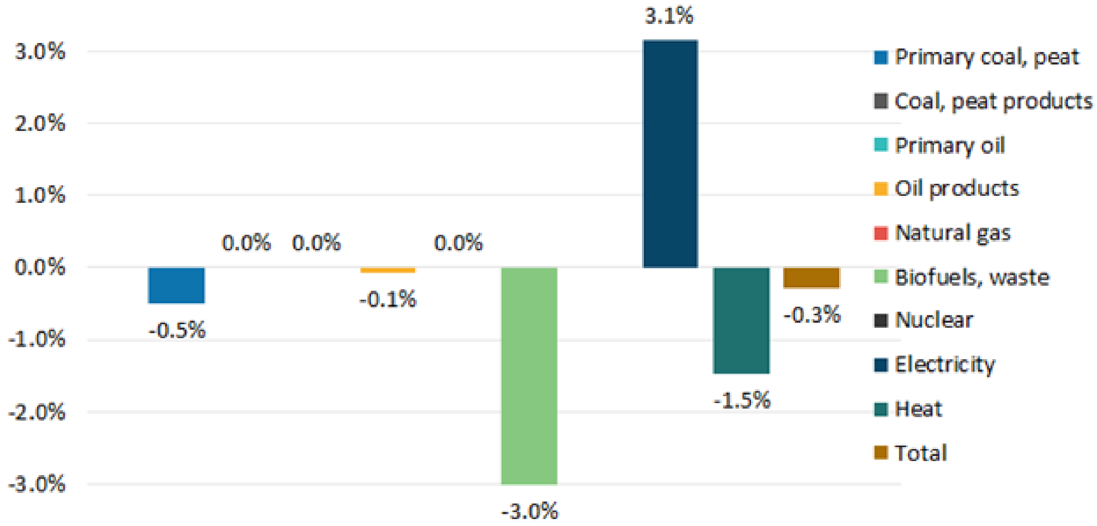

Figure 3: Impacts of Scenario 1 on final energy consumption in 2040 -deviations from reference in %

Scenario 2 (carbon tax investment leverage) differs from scenario 1 in that it is assumed that the **revenues from the carbon tax incentivize investments in renewable energies and heating measures** as discussed above by improved loan conditions. In this case, a factor of 5 is assumed in consultation with national stakeholders. This means that **five times more is invested in the new technologies** and the GHG reduction is also higher in this order of magnitude. By contrast, the direct effect of the lump sum return of revenues on private households remains unchanged compared to scenario 1. Whether the financing of the investments is domestic or international requires more additional in-depth finance modelling in the future.

Surprising at first glance, the **effect on total investment is only around a factor of 3**, for three reasons: Due to the carbon tax and higher GDP, prices for (other) investment goods are also higher, which reduces other investment. At the same time, gross fixed capital formation does not increase fully in line with the higher GDP, which also slows down the increase in investment. And finally, the success of the carbon tax in reducing GHG emissions reduces the tax base and therefore also the revenues available for investments but also for lump sums transfers to private households.

The aforementioned effects also signify that the impact on private consumption is less positive than in scenario 1 with the carbon tax without leverage, while at the same time imports increase significantly. Although the GDP effect is positive compared to the reference, it is lower than in the case of the pure carbon tax in scenario 1. An additional reason for this is that the high import quotas for energy technologies are kept unchanged in the future. And further energy efficiency benefits and cost reductions on electricity or heat markets that could be triggered by climate mitigation investments in the longer term are difficult to quantify and have not been considered. The scenario assumptions are conservative in this regard.

The macroeconomic effects of scenario 2 of the carbon tax with leveraged investment and revenue recycling are again positive compared to the reference. **GDP is 0.18% higher in 2030 than in the reference, and 0.3% higher in 2040**. Investments in renewable energies and heat in particular will increase strongly. At the same time, private households increase their spending with the lump sum revenues. Exports increase as higher coal exports are assumed (of the coal no longer used domestically). Finally, imports will also increase significantly because Mongolia will have to import almost all of the energy technologies.

The higher GDP will also be reflected in **higher employment of 0.23%** compared to the reference in 2040 and **higher gross production of 0.4%** in that year. The **carbon tax leads to higher prices**. The price index of household final consumption will be 0.17% higher compared to the reference in 2030 and 0.37% in 2040.

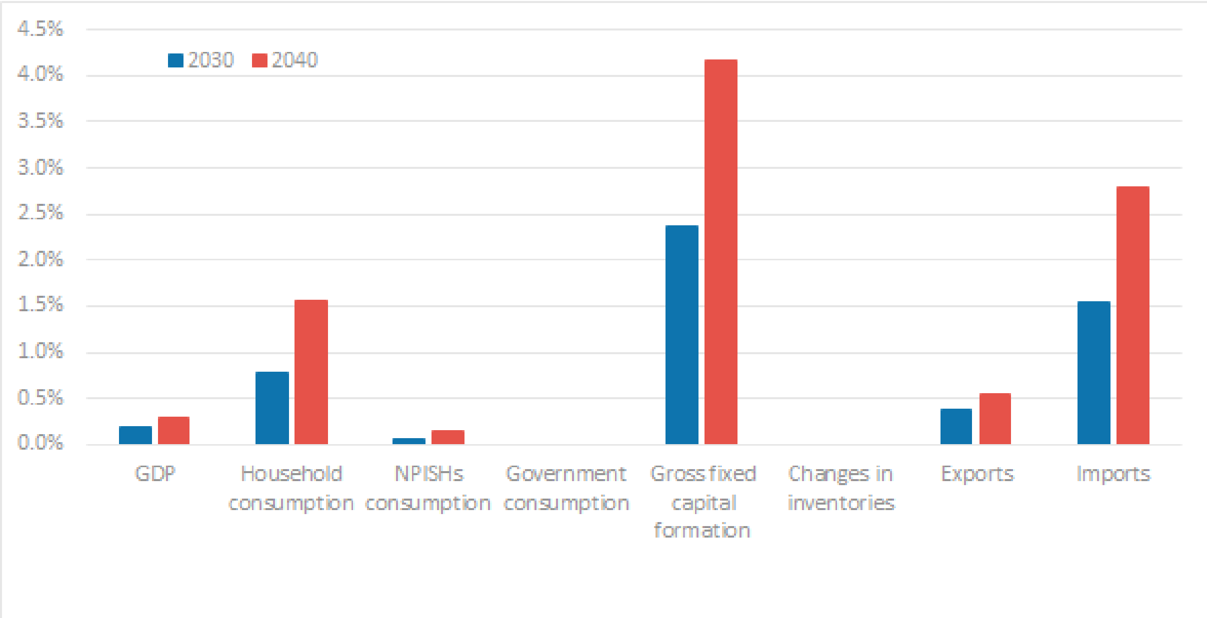

Figure 4: Impacts of Scenario 2 on GDP and components – deviations from reference in %

Figure 5 shows quite strong shifts in the final energy demand mix up to 2040. Less coal is used and the consumption of electricity to generate heat in heat pumps will increase by 12%. For electricity generation less coal is used so that energy related GHG emissions in 2040 could be 5 Mt CO_2 equivalents or 9,6% lower than in the reference scenario.

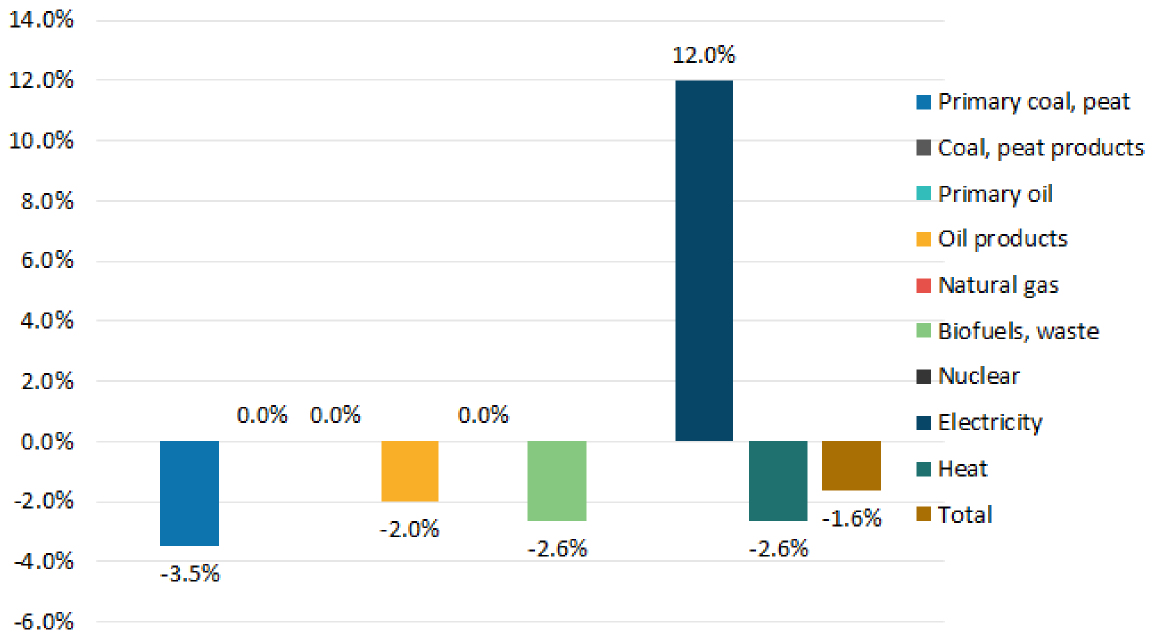

Figure 5: Impacts of Scenario 2 on final energy consumption in 2040 -deviations from reference in %

Discussion and Conclusions

Mongolia faces various challenges to reform its energy markets and to reduce GHG emissions. A carbon tax, which makes the use of fossil fuels more expensive, is a climate mitigation instrument that is being discussed internationally. Using the e3.mn model, two scenarios were calculated alongside a business-as-usual reference. These scenarios envisage a carbon tax in Mongolia starting at 2 USD in 2025, rising to 35 USD by 2040. Half of the revenues are returned to private households as a lump-sum transfer, favoring low-income groups, while the other half is invested in expanding renewable energy and transforming the heating sector. The second scenario assumes that investments in climate protection are promoted through green loans with favorable conditions and leverage. The GHG reduction effects are much higher as a result.

The overall impact on GDP of both carbon tax scenarios compared to the refence is positive. Production and employment also increase slightly. This is primarily triggered by higher investment and private consumption, while higher imports for investment goods are dampening the development. **Higher prices for electricity lead to a rise in the overall price level.** Energy consumption is changing in favor of renewable energies and heat generation with heat pumps. **GHG emissions fall** in both scenarios compared to the reference, depending on the investment in zero-carbon technologies. The carbon tax is therefore an effective instrument for combating climate change and a promising policy option for Mongolia, especially in the light of reform needs in the electricity sector with growing capacity. Renewable energy sources are internationally seen as the most economic option for new electricity installations.

The results correspond to the positive experiences of other countries with a carbon tax (e.g. Metcalf, Stock 2023, Köppl, Schratzenstaller 2023). The World Bank also points to the positive socio-economic effects of carbon pricing, especially as air pollution is also significantly reduced due to the lower use of coal, which improves people's health.

However, the interpretation must of course also take into account the circumstances in Mongolia with the challenges in the energy market and the effects of a potential increase in energy prices, especially for lower income groups. Only if carbon prices are passed through to consumers, the positive effects of the scenarios can be realized. **An electricity market reform is therefore a prerequisite for the effectiveness of the carbon tax**. The Carbon Pricing Incidence Calculator (CPIC - MCC Berlin) is an instrument to further explore the distributional consequences of carbon pricing with revenue recycling (Steckel et al. 2023).

Furthermore, it should be kept in mind that the model is a reduced representation of reality. The model can quantify direction and magnitude of the effects. Whether a carbon tax of the chosen magnitude is politically feasible or not is another question. The model results are also subject to certain assumptions, which influence the results. This applies in particular to assumptions regarding the use of tax revenues, price elasticities and costs of low carbon technologies including electricity and heat price impacts, but also of more general behavior of economic agents. Will it really be possible to trigger additional investments in renewable energies and heating, or will there be delays, so that the negative effects of higher energy prices occur before the positive effects of investments? Can renewable energies and the change in heat generation be easily integrated into the existing energy system, as is implicitly assumed or could costs be higher or even lower? These are some questions that the model can only help to answer to a limited extent, at best in the form of sensitivity calculations.

As a next step, considerations on alternative forms of carbon tax and options for linking it to a reform of the energy markets should be discussed by national stakeholders. Options could then be quantified as further simulations with the e3.mn model. In this process, model assumptions should also be checked for their validity for Mongolia. This is precisely the great advantage of the e3.mn model, which offers the opportunity to simulate expected effects of policy measures in advance and subject them to a reality check. A link with energy market models could also help to consider reform options for the energy market and options for climate mitigation together with the aim to develop the best possible policy measures.

Climate change, climate mitigation, energy supply for a growing population and economy as well as the economic diversification and reducing the import dependencies are challenges for Mongolia. A joint policy approach to address them can help to develop and assess new policy reform options. **The expansion of new energy technologies also depends heavily on the regulatory framework**, such as an electricity market reform and the simplification of approval processes, or systemic improvements, such as grid extension and storage, to feed renewable energy into the electricity grid. Carbon pricing can incentivize transformation in energy markets and for mitigating climate change and generate revenues to offset potential burdens.

References

Danish Energy Agency (2024): Data Technology Data Catalogue for Electricity and district heating production – Data sheet for Electricity and district heating -Updated February 2024. https://ens.dk/en/our-services/technology-catalogues

GIZ (2023a): Großmann, A., Hohmann, F. & Reuschel, S. (2023): Economy-wide impacts of climate change and adaptation in Mongolia. Assessing the macroeconomic impacts of climate change and adaptation in Mongolia with the E3 prototype model, Berlin.

https://www.giz.de/en/downloads/giz2023-en-handbook-e3-prototype-model.pdf

GIZ (2023b): Großmann, A., Hohmann, F., Lutz, C., Flaute, M., Heinisch, K., Schult, C. & Banning, M. (2023): Lessons Learnt from Piloting Macroeconomic Modelling for Climate Resilience. In Georgia, Kazakhstan and Vietnam, Berlin.

https://www.giz.de/en/downloads/giz2023-en-global-report.pdf

Huntington, H.G., Barrios, J.J. Arora, V. (2019): Review of key international demand elasticities for major industrializing economies, Energy Policy, Volume 133, 2019, 110878, ISSN 0301-4215, https://doi.org/10.1016/j.enpol.2019.110878.

International Energy Agency (IEA) (2021): Net Zero by 2050. A roadmap for the global energy sectorhttps://www.iea.org/reports/net-zero-by-2050, https://www.iea.org/reports/net-zero-by-2050

International Energy Agency (IEA) (2023): World Energy Outlook 2023, Paris. https://iea.blob.core.windows.net/assets/6e592d82-b8c4-4521-8d14-71886b2ecfb8/WorldEnergyOutlook2023.pdf.

International Energy Agency (IEA) (2024): Renewables 2024. Analysis and forecast to 2030.

https://iea.blob.core.windows.net/assets/45704c88-a7b0-4001-b319-c5fc45298e07/Renewables2024.pdf

IRENA (2023: Renewable energy solutions for heating systems in Mongolia: Developing a Strategic heating plan, International Renewable Energy Agency, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Aug/IRENA_Renewable_energy_solutions_heating_Mongolia_2023.pdf

IRENA (2024): Renewable power generation costs in 2023, International Renewable Energy Agency, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Sep/IRENA_Renewable_power_generation_costs_in_2023.pdf

Intergovernmental Panel on Climate Change (IPCC) (2023): Synthesis Report of the IPCC Sixth Assessment Report – Summary for Policymakers. https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf

Köppl, A. & Schratzenstaller, M. (2023): Carbon taxation: A review of the empirical literature. Journal of Economic Surveys 37, S. 1353–1388. DOI: 10.1111/joes.12531.

Labandeira, X., Labeaga, J. M. & López-Otero, X. (2017): A meta-analysis on the price elasticity of energy demand. Energy Policy 102, S. 549–568. DOI: 10.1016/j.enpol.2017.01.002.

Metcalf, Gilbert E., Stock, James H. (2023): The Macroeconomic Impact of Europe's Carbon Taxes. American Economic Journal: Macroeconomics, 15 (3): 265–86.

Steckel, J., Missbach, L. & Schiefer, T. (2023). The global Carbon Pricing Incidence Calculator (CPIC) (Version 1.0). http://www.cpic-global.net .

World Bank. 2024. State and Trends of Carbon Pricing 2024. Washington, DC. http://hdl.handle.net/10986/41544

The World Bank Group and the Asian Development Bank (2021): Climate Risk Country Profile: Mongolia, Washington, DC and Manila. https://hdl.handle.net/10986/36375

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices:
Bonn and Eschborn, Germany

Regional Programme:
'Capacity Development for climate policy in the countries of South East, Eastern Europe, the South Caucasus and Central Asia, Phase III'

Köthener Str. 2-3, 10963 Berlin, Germany
T + 49 30 338424 – 197
F + 49 30 33842422 – 197
E ilka.starrost@giz.de
I www.giz.de/en

This project is part of the International Climate Initiative (IKI). The Federal Ministry for Economic Affairs and Climate Action (BMWK) supports this initiative on the basis of a decision adopted by the German Bundestag. For more information: www.international-climate-initiative.com

Prepared by:
GWS mbH
Christian Lutz, Anett Großmann, Heinrichstrasse 30, 49078 Osnabrück, Germany

Concept & Design:
Atelier Löwentor GmbH, Darmstadt

Photo credits/sources:
GIZ

On behalf of Federal Ministry for Economic Affairs and Climate Action (BMWK)