

Mongolia | Impacts of Adaptation in Agriculture - Drip Irrigation

Find the underlying analysis in the report "[Economy-wide impacts of Climate Change and Adaptation in Mongolia](#)" (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's agriculture is vulnerable to climate change



Droughts and heatwaves may lead to lower pasture productivity, which results in decreased **livestock production**.



Droughts and heatwaves may cause crop losses and limit growing season



Heatwaves may decrease the productivity of people working outside as in the agriculture sector.

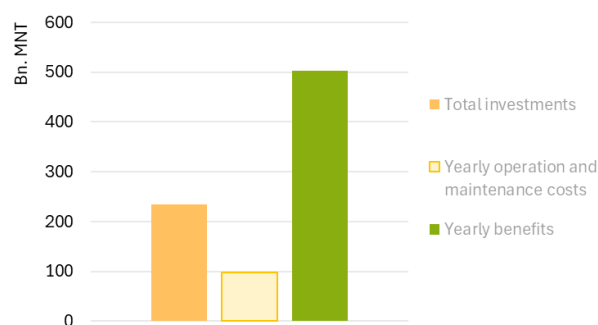


Negative impacts on agriculture can lead to **lower growth in other sectors, lower GDP and employment**.

Exemplary adaptation measure for reducing vulnerability to droughts

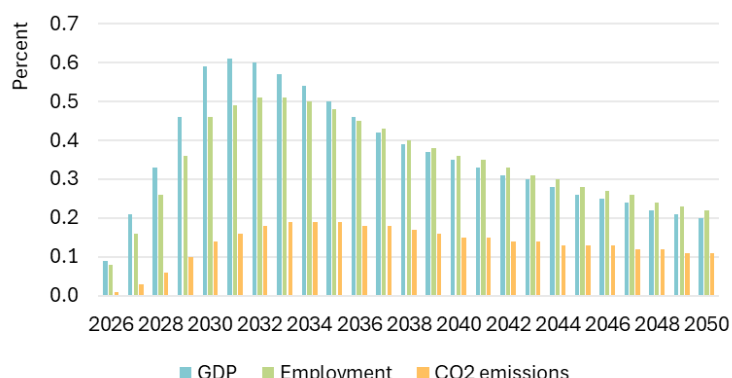


Investing in expanding **drip and permeable irrigation systems** is a key response to climate change to **prevent water scarcity** and to improve agricultural productivity. Such measures would allow to increase the irrigated area by 290,000 hectares



Economy-wide benefits of irrigation systems

Economy-wide impacts of investing in drip irrigation (SCCA compared to SCC)



Reference: CBA conducted for the GCF funded UNEP/MET implemented project "Building Capacity to Advance National Adaptation Plan Process in Mongolia", see also National Climate Committee (2021): Action Plan for Implementation of Nationally Determined Contributions. Annex to the National Climate Committee's resolution No. 01/21 dated 2021.

- Expanding irrigated area result per year in **up to 0.6% higher GDP (resp. 270 bn. MNT)** and **up to 0.5% higher employment corresponding to more than 7,000 additional jobs** (SCCA compared to SCC).
- Investments in **irrigation systems** significantly reduce the drought damage which results in **higher agricultural output – also in years without droughts occurring**. Other sectors along the value chain are **indirectly, positively affected** (SCCA compared to SCC).
- The investments lead to annual increases of **combustion-related CO₂ emissions of up to 0.2%** following a higher energy demand.

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Mongolia | Impacts of Adaptation in Agriculture - Watering Points I

Find the underlying analysis in the report "[Economy-wide impacts of Climate Change and Adaptation in Mongolia](#)" (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's agriculture is vulnerable to climate change



Droughts and heatwaves exacerbate degradation causing **reduced fodder** and **water availability** affecting livestock and crop production



Livestock health, quality and mortality is worsened by lower pasture productivity and **dzuds**



The **productivity of people working outside** as e.g. in the agriculture sector may decrease during **heatwaves**.

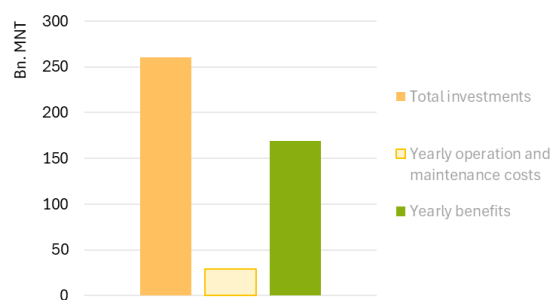


Negative impacts on agriculture can lead to **lower growth in other sectors, lower GDP** and **employment**.

Exemplary adaptation measure for reducing vulnerability to droughts and heatwaves: Additional watering points

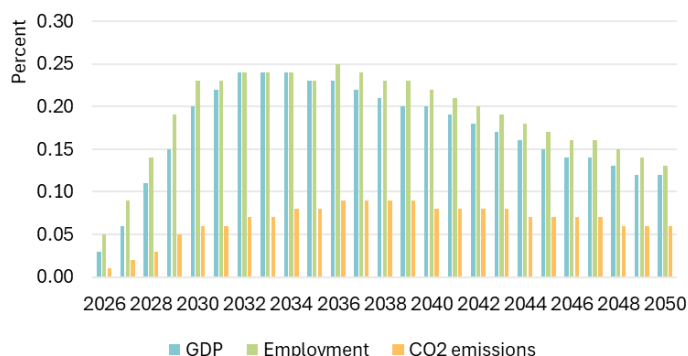


Implementing new livestock watering points help to **improve access to water** and **enlarge effective grazing area** for livestock. The examined measure comprises investment, for example, in wells, ponds, stables, fences, and machinery financially supported by the government.



Economy-wide benefits of investments in additional watering points

Economy-wide impacts of new watering points for livestock (SCCA compared to SCC)



Reference: CBA conducted for the GCF funded UNEP/MET implemented project "Building Capacity to Advance National Adaptation Plan Process in Mongolia", see also National Climate Committee (2021): Action Plan for Implementation of Nationally Determined Contributions. Annex to the National Climate Committee's resolution No. 01/21 dated 2021.

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- Investments in **800 new watering points** result per year in **up to 0.24% higher GDP** (resp. 120 bn. MNT) and **up to 0.8% higher employment** corresponding to more than 3,400 additional jobs (SCCA compared to SCC).
- Investments in **new watering points improves livestock quality** resulting in higher carcass weight, milk production and wool quality. Other sectors are positively affected from value chain and income-induced effects (SCCA compared to SCC).
- The investments lead to annual increases of **combustion-related CO₂ emissions of up to 0.1%** if no mitigation measures are taken and economic activity accelerates.

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Mongolia | Impacts of Green Loan-Financed Adaptation in Agriculture - Watering Points II

Find the underlying analysis in the report "Economy-Wide Impacts of Green Loan-Financed Climate Adaptation and Mitigation in Mongolia" (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's agriculture is vulnerable to climate change



Droughts and heatwaves exacerbate degradation causing **reduced fodder** and **water availability** affecting livestock and crop production



Livestock health, quality and mortality is worsened by lower pasture productivity and **dzuds**



The **productivity of people working outside** as e.g. in the agriculture sector may decrease during **heatwaves**.

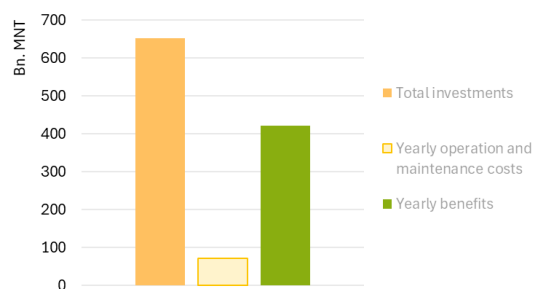


Negative impacts on agriculture can lead to **lower growth in other sectors, lower GDP** and **employment**.

Exemplary adaptation measure for reducing vulnerability to droughts and heatwaves: Additional watering points

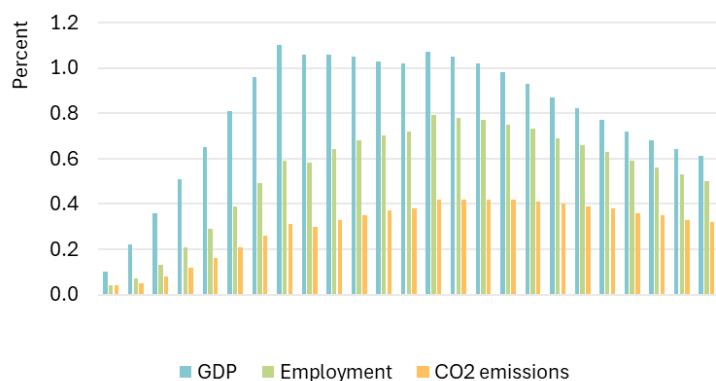


Implementing new livestock watering points help to **improve access to water** and **enlarge effective grazing area** for livestock. The examined measure comprises investment, for example, in wells, ponds, stables, fences, and machinery. Herders are financially supported by **green loans**.



Economy-wide benefits of investments in additional watering points

Economy-wide impacts of new watering points for livestock (SCCA compared to SCC)



Reference: CBA conducted for the GCF funded UNEP/MET implemented project "Building Capacity to Advance National Adaptation Plan Process in Mongolia", see also National Climate Committee (2021): Action Plan for Implementation of Nationally Determined Contributions. Annex to the National Climate Committee's resolution No. 01/21 dated 2021.

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

→ Investments in **2,000 new watering points** result per year in **up to 1.1% higher GDP** (resp. 636 bn. MNT) and **up to 0.8% higher employment** corresponding to more than 11,000 additional jobs (SCCA compared to SCC).

→ Investments in **new watering points improves livestock quality** resulting in higher carcass weight, milk production and wool quality. Other sectors are positively affected from value chain and income-induced effects (SCCA compared to SCC).

→ The investments lead to annual increases of **combustion-related CO₂ emissions of up to 0.4%** if no mitigation measures are taken and economic activity accelerates. **GHG emission savings** can be expected from **pond establishment**.

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Mongolia | Impacts of Adaptation in Water Sector – Tuul River Complex

Find the underlying analysis in the report “[Economy-wide impacts of Climate Change and Adaptation in Mongolia](#)” (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's infrastructure and agriculture are vulnerable to climate change



Floods are a risk for the infrastructure and the people. They cause soil erosion impacting agricultural productivity.



Floods may lead to production losses due to interruptions in energy supply and supply chains.

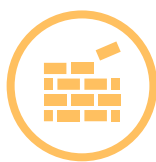


Crop losses induced by water scarcity can be a consequence of **droughts** and **heatwaves**.

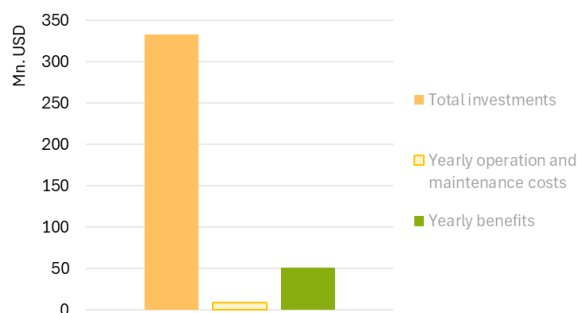


Negative impacts on infrastructure can lead to **lower growth in other sectors, lower GDP and employment**.

Exemplary adaptation measures for reducing vulnerability to floods: Tuul River Basin Integrated Water Management Plan



Integrated water management helps to reduce the risk of being flooded by collecting excess water. It is expected that 50% of the damage caused by flooding can be avoided. Storing and treating the water for multipurpose use (e.g., supplying water to households) makes the investment even more beneficial.



Economy-wide impacts of integrated water management (Tuul River Complex)

Economy-wide impacts of Tuul river complex (SCCA compared to SCC)



References: Prestige Engineering (n.d.): The “Tuul Water Complex”. Prestige. <https://prestige.mn/en/projects/show/tuulusan-tsoqtsolbor-t-s-l>
Ministry of Environment and Green Development (2012): Tuul River Basin – Integrated Water Management Plan. MEGD, Ulaanbaatar, Mongolia. <https://faolex.fao.org/docs/pdf/mon169814.pdf>

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- Investments in 12 water reservoirs result annually in up to **1.8% higher GDP** and **up to 1.4% higher employment** (SCCA compared to SCC).
- During implementation period, construction and indirectly impacted sectors such as mining and quarrying as well as trade and transport show accelerated production.
- **Combustion-related CO₂ emissions rise** by up to 1.1% per year due to and accelerated energy demand (SCCA compared to SCC).
- Involuntary spendings and reconstruction activities can be avoided due to damage reduction.

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Mongolia | Impacts of Adaptation in Water Sector - Water Reservoirs

Find the underlying analysis in the report "[Economy-wide impacts of Climate Change and Adaptation in Mongolia](#)" (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's infrastructure and agriculture are vulnerable to climate change



Floods are a risk for the infrastructure and the people. They cause soil erosion impacting agricultural productivity.



Floods may lead to production losses due to interruptions in energy supply and supply chains.

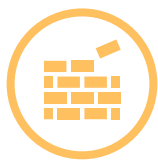


Crop losses induced by water scarcity can be a consequence of **droughts** and **heatwaves**.

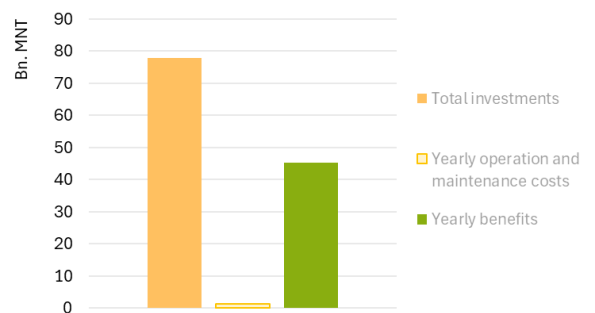


Negative impacts on infrastructure can lead to **lower growth in other sectors, lower GDP and employment**.

Exemplary adaptation measures for reducing vulnerability to floods: counter-regulatory reservoirs

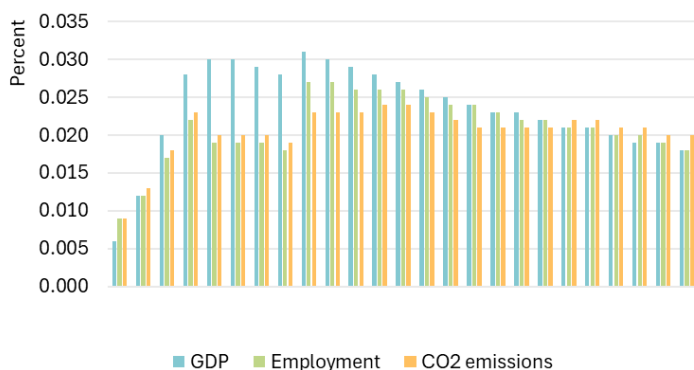


Multi-purpose water infrastructure reduce the risk of being flooded by harvesting excess water. It is expected that 50% of the damage caused by flooding can be avoided. Furthermore, reservoirs provide additional water to be used in agriculture and mining increasing sectoral production.



Economy-wide impacts of counter-regulatory reservoirs with application in agriculture

Economy-wide impacts of new water reservoirs in high mountain area (SCCA compared to SCC)



Reference: CBA conducted for the GCF funded UNEP/MET implemented project "Building Capacity to Advance National Adaptation Plan Process in Mongolia", see also National Climate Committee (2021): Action Plan for Implementation of Nationally Determined Contributions. Annex to the National Climate Committee's resolution No. 01/21 dated 2021.

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- Investments in 12 water reservoirs result annually in up to **0.03% higher GDP** and **up to 0.03% higher employment** (SCCA compared to SCC).
- The measure is beneficial for agriculture due to more irrigated land and better irrigation during droughts.
- Mining is also expected to benefit from improved water supply.
- **Combustion-related CO₂ emissions slightly rise** by up to 0.02% per year due to higher economic activity (SCCA compared to SCC).
- Involuntary spendings and reconstruction activities can be avoided due to damage reduction.

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Mongolia | Impacts of Green Loan-Financed Mitigation in Buildings I

Find the underlying analysis in the report "Economy-Wide Impacts of Green Loan-Financed Climate Adaptation and Mitigation in Mongolia" (GIZ, 2025)



Annual changes in % are between a baseline scenario (SSP-8.5) and a "Energy efficiency in buildings, panel apartments" scenario (SSP-8.5_CFE_PA).

"Energy efficiency in buildings, panel apartments" Scenario



Around 20% of Mongolia's capital Ulaanbaatar's residents are living in prefabricated panel buildings. They are increasingly energy inefficient, with poor insulation leading to cold interiors, leaky roofs, and persistent mold problems. Retrofitting these buildings is the aim of the RePaRe project of GIZ.



The scenario is based on experiences and key figures from the RePaRe project. In the current project phase, 200 apartment buildings are to be renovated between 2022 and 2027 with an investment of 25 Mn. euros.

Assumptions for the Scenario



Investments in **Insulation/construction** of USD 30 Mn. will be made between 2026 and 2030.



30 % of investments are financed by **government subsidies**, 20 % come from **international sources**.



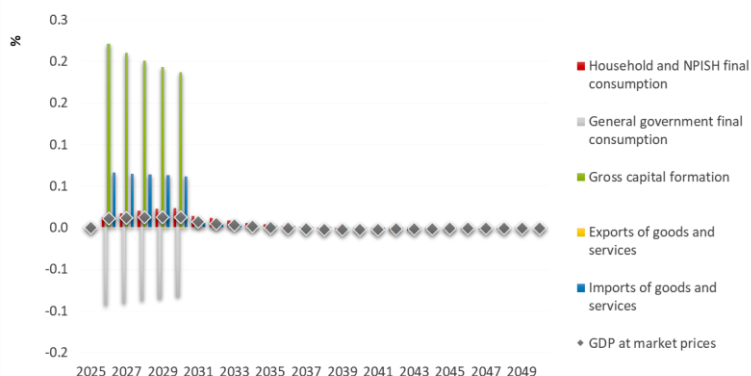
Households provide 25% via **green loans** and will pay off further 25 % monthly over 10 years interest-free.



Households will **benefit economically** from insulation; energy costs will fall.

Economy-wide effects of energy efficiency in panel apartments

Real GDP impacts of "SSP5-8.5_CFE_PA" scenario (deviations from "SSP5-8.5" scenario in percent)



Reference: The GIZ-RePaRe project foresees the implementation of the thermo-technical retrofitting of the panel building blocks. Key figures on financial requirements and energy savings are taken and projected from earlier project phases. For more information on RePaRe see [Promoting renewable energies in Mongolia | GIZ](#).

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of climate mitigation measures.

- The USD 6 Mn. investment in energy efficiency for panel apartments will primarily boost investment in building envelopes, leading to a slight GDP increase and higher capital goods imports.
- The impact on overall GDP and energy savings (0.7 bn. MNT p.a.) will be limited, as effects mainly involve shifts in household spending.
- Effects on energy consumption and GHG emission (-14 kt) remain limited as the program only covers a small proportion of panel apartments in Mongolia. However, the simulation shows the fundamental potential if corresponding measures are extended to the entire building stock.

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Mongolia | Impacts of Green Loan-Financed Mitigation in Buildings II

Find the underlying analysis in the report "Economy-Wide Impacts of Green Loan-Financed Climate Adaptation and Mitigation in Mongolia" (GIZ, 2025)



Annual changes in % are between a baseline scenario (SSP-8.5) and a "Energy efficiency in buildings, ger houses" scenario (SSP-8.5_CFE_GH).

"Energy efficiency in buildings, ger houses" Scenario



Mongolia's capital Ulaanbaatar is the most polluted city in winter. The Geres project tackles this problem by improving the energy efficiency and insulation of individual houses in the ger areas of Ulaanbaatar and promoting the reduction of coal consumption for heating.



This scenario is based on experiences and key figures from Geres. In the current project phase (2022-2026) the aim is to scale-up inclusive, contextualized, affordable, and financially viable Energy Efficiency (EE) solutions to decrease intensity, cost, GHG emissions of energy, and maximize health, economic and social benefits.

Assumptions for the Scenario



Investments in Insulation of USD 25 Mn. will be made between 2026 and 2030.



40% of investments come from **government subsidies** and 35% from **international financial sources**.



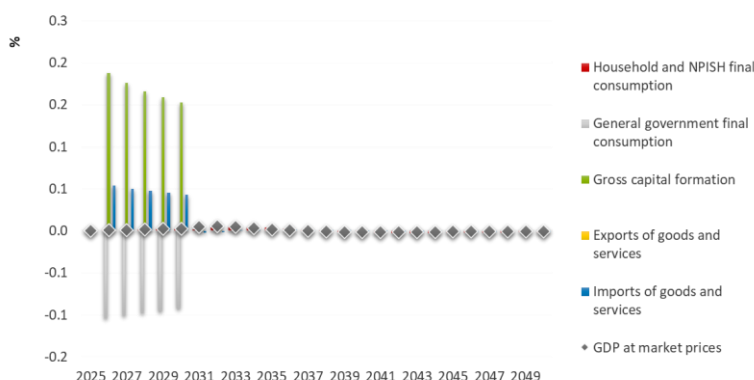
Households (25%) have a higher spending for **real estate services** via **green loans** and for **financial services**.



Households will **benefit economically** from insulation resulting in lower spending for energy.

Economy-wide effects of energy efficiency in Ger houses

Real GDP impacts of "SSP5-8.5_CFE_GH" scenario (deviations from "SSP5-8.5" scenario in percent)



Reference: The Geres project supports the implementation of the retrofitting individual houses in "Ger districts" in the capital city. Key figures on financial requirements and energy savings are taken and projected from earlier project phases. For more information on Geres see <https://www.geres.eu/en/news/project-news/ulaanbaatar-actions-fight-against-air-pollution-until-2026/> <https://www.geres.eu/wp-content/uploads/2023/02/SOAP-II-FS-Eng-1.pdf>

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of climate finance measures.

- The USD 5 Mn. investment in energy efficiency for ger houses will primarily boost investment in building envelopes, leading to a slight GDP increase and higher capital goods imports.
- The impact on overall GDP and energy savings (0.9 bn. MNT p.a.) will be limited, as effects mainly involve shifts in household spending.
- Effects on energy consumption and GHG emission (-12 kt) remain limited as the program only covers a small proportion of ger houses in Mongolia. However, the simulation shows the fundamental potential if corresponding measures are extended to all ger houses.

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Mongolia | Impacts of Green Loan-Financed Mitigation in Electricity Sector

Find the underlying analysis in the report "Economy-Wide Impacts of Green Loan-Financed Climate Adaptation and Mitigation in Mongolia" (GIZ, 2025)



Annual changes in % are between a baseline scenario (SSP-85) and a "electricity sector: liberalization and energy transition" scenario (SSP-8.5_CFE_EL_DEL).

"Liberalization first, Carbon tax later" Scenario



To liberalize the energy sector and meet Mongolia's envisaged GHG emission reduction goal by 2030, energy production needs to overcome major challenges which requires investments. The scenario is driven by the assumption that electricity price liberalization and green loans will lead to additional investment in the energy sector until 2030.



Liberalization of the electricity market and the introduction of the carbon tax take place one after the other. The carbon tax will only be introduced in 2031 in order to spread the burden on electricity consumers over time.

Assumptions for the Scenario



Green loans for renewables will triple to **MNT 285 Bn. by 2030.**



Investments will lead to **additional investments in renewable energies** of **USD 50 Mn. in that year.**



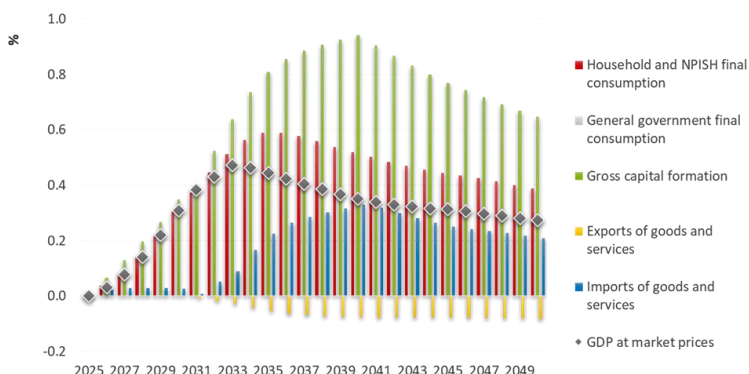
Electricity prices are increased by an **additional 30%** by 2030 compared to the baseline scenario, to mirror price liberalization.



A **carbon tax** will be introduced in 2031 that increases linearly to **USD 35,5/t CO₂** in 2050. Revenues will be recycled.

Economy-wide effects of liberation and carbon tax

Real GDP impacts of "SSP5-8.5_CFE_EL_DEL" scenario (deviations from "SSP5-8.5" scenario in percent)



Reference: Own assumptions on green loans for renewables, further electricity price increases, and cost development projections from international sources, coordinated with the Bank of Mongolia. Own study on carbon tax in Mongolia: [Lutz, C. & Großmann, A. \(2024\): Macroeconomic Effects of Carbon Pricing in Mongolia. Macroeconomic Modelling of a Carbon Tax. Policy Brief, Bonn, Eschborn.](#)

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of climate mitigation measures as market liberalization and carbon tax.

- Annual investment is up to 1.2% higher than in the baseline scenario. Private household consumption may also increase by up to 0.7% annually.
- Higher economic output also leads to an increase in imports, partly because many capital goods come from abroad. Higher domestic prices, on the other hand, reduce price competitiveness vis-à-vis other countries, leading to slightly lower exports.
- Compared to the baseline, GDP is about 0.5% higher at its peak.

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Mongolia | Impacts of Green Loan-Financed Adaptation in Agriculture – Sustainable Pasture Management

Find the underlying analysis in the report “Economy-Wide Impacts of Green Loan-Financed Climate Adaptation and Mitigation in Mongolia” (GIZ, 2025)



Annual changes in % are between a climate change scenario without adaptation (SCC) and a climate change scenario with adaptation (SCCA).

Mongolia's agriculture is vulnerable to climate change



Droughts and heatwaves exacerbate degradation causing **reduced fodder** and **water availability** affecting livestock and crop production



Livestock health, quality and mortality is worsened by lower pasture productivity and **dzuds**



The **productivity of people working outside** as e.g. in the agriculture sector may decrease during **heatwaves**.

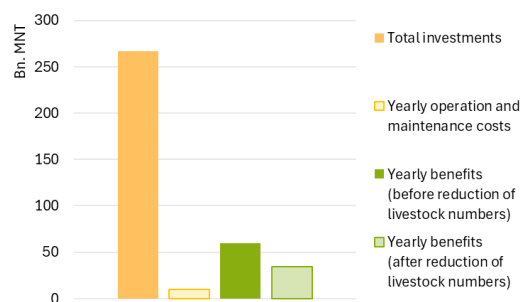


Negative impacts on agriculture can lead to **lower growth in other sectors, lower GDP** and **employment**.

Exemplary adaptation measure for reducing vulnerability to droughts and heatwaves: Sustainable livestock and pasture management

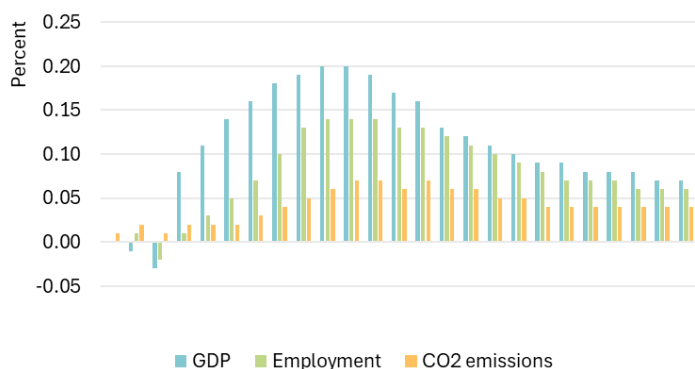


Pastureland user agreements (PUA) help to **organize the sustainable use of pastureland**. The **reduction of livestock numbers** contributes a more climate-resilient livestock farming without income losses. The required investment by the herders, e.g. for the establishment of shelters, fences and other equipment are financially supported by **green loans**.



Economy-wide benefits of sustainable livestock and pasture management

Economy-wide impacts of sustainable pasture management (SCCA compared to SCC)



Reference: Asian Development Bank (2021): Proposed Loans and Administration of Technical Assistance Grant Mongolia: Climate-Resilient and Sustainable Livestock Development Project. <https://www.adb.org/sites/default/files/project-documents/53038/53038-001-rrp-en.pdf>

Macroeconomic modelling allows for **long-term assessment of economy-wide effects** of adaptation measures.

- During implementation period GDP accelerates due to necessary investment resulting in **up to 0.2% higher GDP** (resp. 103 bn. MNT) and **up to 0.1% higher employment** corresponding to more than 2,000 additional jobs (SCCA compared to SCC).
- PUA result in a reduced number of livestock but improved livestock quality and quantity per animal. Other sectors are positively affected from value chain and income-induced effects (SCCA compared to SCC).
- The investments lead to annual increases of **combustion-related CO₂ emissions of up to 0.1%** if no mitigation measures are taken and economic activity accelerates. **GHG emission savings** can be expected from **less livestock numbers**.

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