

## Technology concept submission form

### Guidelines:

- Technology concept submission form should be completed by an applicant organization in collaboration with the national focal points to the CTCN (National Designated Entity, NDE) and the Adaptation Fund (Designated Authority) of the country. Please see updated contact list of the NDEs and the Designated Authorities through web-links as below:
  - NDE: <https://unfccc.int/ttclear/support/national-designated-entity.html>
  - Designated Authority: <https://www.adaptation-fund.org/apply-funding/designated-authorities/>
- The form must be signed by the NDE before official submission to UNEP-CTCN.
- The form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file.
- For the technology concept submitted by multiple countries, all the NDEs of the respective countries shall sign identical forms before official submission to UNEP-CTCN.

### No1

<b>Country or countries:</b>	<b>Mongolia</b>
<b>Title of the technology concept:</b>	Reducing smallholder vegetable farmers' vulnerability to climate change impacts including water scarcity in Mongolia through EbA and digitalized risk mitigation insurance solutions
<b>NDE:</b>	<i>Ministry of Environment and Tourism of Mongolia , Dr. Tserendulam Shargadsuren, email: tserendulam@mne.gov.mn; tserendulamsh@gmail.com, Artsatyn 624, Khan Uul district, Khoroo 24, Ulaanbaatar, Mongolia</i>
<b>Applicant:</b>	<i>Government of Mongolia (Ministry of Environment and Tourism; and Ministry of Food, Agriculture and Light Industry), Dr. Tserendulam Shagdarsuren, Director-General, Climate Change and Policy Planning Department, email: tserendulam@mne.gov.mn, Artsatyn 624, Khan Uul district, Khoroo 24, Ulaanbaatar, Mongolia</i>

<b>Geographical scope:</b>	
<input checked="" type="checkbox"/> Community level <input checked="" type="checkbox"/> Sub-national <input type="checkbox"/> National <input type="checkbox"/> Multi-country	
<i>If the technology concept is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).</i>	
Two pilot provinces have been identified for this concept by the Ministry of Environment and Ministry of Food, Agriculture and Light industry in Mongolia. These provinces are the Dundgobi	

(desert steppe region) and Uvurkhangai (steppe region) provinces. The selection is based on the particularly high level of vulnerability to climate change that these provinces witness and that negatively affects vegetable production, and the urgent need to protect the livelihoods of smallholder farmers and food security for the country.

The proposed technology solution has been scoped out under the NDC Action Project funded by the German Government being led by the Government of Mongolia, international and national technical experts, key stakeholders including private sector technology providers and investors, financial institutions, insurance companies, smallholder vegetable farmers. The recommended technology solution stems from the scoping, and proactive partnerships created across stakeholder groups. This includes consideration of financial arrangements, risk mitigation instruments and digitalization of the solution for the long-term sustainability of the climate change adaptation actions.

Further substantiation for the selection of the two provinces, based on climate change impacts, is provided in Section No 2 below.

**No2**

**Problem statement related to climate change (up to one page):**

*This section should answer the question “what is the problem?” Please summarise the problem related to climate change and/or the negative impacts of climate change in the country that the technology concept aims to address.*

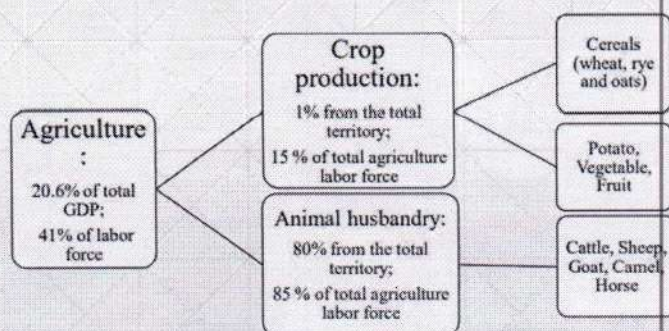
**Problem statement**

The technology concept addresses climate change risks and vulnerabilities faced by smallholder vegetable farmers in Mongolia by proposing the design of an innovative ecosystem based adaptation solution that provides more efficient ways to grow vegetables at the household level, to reduce food insecurity, and to provide insurance protection for vegetable farming activities.

The harsh climate of Mongolia, the short growing period (at most 3-4 months) and lack of irrigation presents a constant challenge for growing vegetables. In 2016, while domestic needs for wheat and potatoes were fully met through domestic production, only 55 percent of the demand for vegetables was met.<sup>1</sup> However support for vegetable smallholders and their farming practices has been largely overlooked. The agriculture sector in Mongolia comprises about 20.6 % of total country GDP, of which 80% is from the livestock sector and 20% from the crop sector. Crop production in Mongolia accounts for less than 1% of the total territory, and of that, vegetable farming accounts for less than 2% of the planted land. With a large and increasing share of the population’s demand for vegetables coming from imports, the Government of Mongolia is keen to reduce the country’s dependance on imports which are increasingly scarce with rising prices. In addition, there is a large untapped potential to increase the scale of vegetable production which could provide food security for the population and improve livelihoods of the most vulnerable farming communities in the country.

<sup>1</sup> <https://un-csam.org/sites/default/files/2020-12/5MN.pdf>

Main Components of Agriculture Mongolia



Source: <https://un-csam.org/sites/default/files/2020-12/5MN.pdf>

Vegetable production is still largely manual, complex, and expensive across the country. Today, the level of mechanization of vegetable production is only 38 percent. About 96.5 percent of farmers irrigate their fields with surface irrigation (non-mechanized). Greenhouses, which can extend the growing period by providing a warmer climate inside the greenhouse during cold periods, are not available for most smallholder vegetable farmers. The available greenhouses are rudimentary and lack durability and thus are extremely vulnerable to harsh environment and climate conditions including from high wind, storms and hail. Furthermore, risk management instruments such as insurance products are not offered for vegetable farming exposing these smallholders to the devastating impacts of climate change driven losses on their livelihoods. There are approximately 150,000 vegetable smallholder farmers in the country with the average landownership at 5 hectares per smallholder. This average is skewed by a handful of well-off farmers that grow vegetables as an add-on business, with the majority of smallholder farmers owning less than 1 hectare. Each smallholder family feeds for itself with the small amounts of vegetable produce to sell for the family's immediate monetary needs. There is a lack of community-based vegetable farming models that can be replicated. Although vegetable farming in the country is practised by a relatively dispersed and small number of farmers, there is potential to increase this number by several fold. Mr Munkhjargal, head of the department of Food and Agriculture, Ministry of Food, Agriculture and Light Industry for the Dundgobi province indicated that additional land can be made available for the smallholder vegetable farmers at low to no cost. The issue is providing these smallholders with viable farming solutions that integrates sustainable irrigation, greenhouses, climate resilient practices and insurance cover, amongst other activities. Mr Munkhjargal also has a longer term vision to bring in agroforestry activities that promote planting of orchids and other productive use that could lead to export driven value chains.

#### Climate Change Risks and Vulnerabilities

Mongolia is extremely vulnerable to the effects of climate change, ranked 67th out of 181 in the 2020 ND-GAIN Index. From 1940 to 2015, average temperatures in the country increased by 2.2°C, triple the global average and already beyond the temperature target set by the Paris Agreement<sup>2</sup>. Since 1940, annual precipitation has decreased by 7%, seasonal rainfall patterns have become erratic, and the frequency of extreme weather events such as drought and dzud has increased.

In the winter of 2023/24, the country experienced one of its harshest winters in fifty years due to a particularly strong Dzud covering over 76 per cent of the country. The Mongolia Dzud Response

<sup>2</sup> ADB. 2021. Climate Risk Country Profile: Mongolia. Manila.

Plan, launched on 25 March, identifies over 200,000 people in need, with 77,000 of the most vulnerable people targeted to receive in-kind and cash assistance, for which US\$13.7 million is required. These figures represent a more than doubling of humanitarian needs since 19 February (150,000 people in need, 17,000 people targeted), when the first version of the early action and response plan was launched, highlighting the severity of the Dzud.<sup>3</sup> Vegetable farmers are amongst the most vulnerable communities in Mongolia. During such events, access to an effective digitalised insurance mechanism is critical to their survival. The project team met with 12 farmers (mostly women) in Dundgobi in February/March 2024, and verified the severe impacts of the Dzud and their needs to adapt to the changing climatic conditions – see AnnexB.

According to the Technology Needs Assessment (TNA)<sup>4</sup> for Mongolia, climate change vulnerability in the Dundgobi (desert steppe region) and Uvurkhangai (steppe region) provinces, particularly for arable lands, is very high. Between 2045 and 2065 it is expected that these areas will move into the most vulnerable climate change category.<sup>5</sup> Coupled with uncontrolled logging activities, unsustainable water use and nomadic pastoralism, the extreme weather events have resulted in land degradation, water depletion and desertification affecting 70% of the grasslands of the country to varying degrees<sup>6</sup>. This negatively affects productivity for smallholder vegetable farmers, causing food security issues for the country’s population.

The Dundgobi and Uvurkhangai provinces are characterized by an important unmet potential due to the particularly high level of vulnerability to climate change of their agricultural sector and the lack of appropriate adaptation practices and technologies amongst smallholder farmers engaged in vegetable production. In 2022, only 21.5 hectares out of 80.2 hectares of arable land was used in the Dundgobi province and 281.3 hectares out of 331.3 hectares in the Uvurkhangai Province. The average yield of vegetables in the Uvurkhangai and Dundgobi provinces are 100 tons/ha and 80 tons/ha, respectively, compared to the national average yield of 110 tons/ha.

**Climate Change Impacts on Vegetable Farming**

The negative effects of climate change that impact water supply and soil quality for vegetable production in these areas are: 1. dryness and lack of soil moisture in spring and early summer; 2. wide differences between day and night air temperature; 3. summer overheating; 4. extended duration of the hot period; 5. increased frequency of heavy rains and floods; 6. the frequency of strong winds; and 7. The increased intensity of dzud events (extreme winter conditions). These factors inhibit the growth of cultivated plants, intensify soil erosion and degradation, and create conditions for late ripening, yield reduction, and product quality deterioration. Due to long winter periods, even under normal conditions, the ground is frozen for several months preventing of frost sensitive plants. Optimal growing periods – without cover - usually last about 4 months of the year. For the remaining months, greenhouses will protect plants such as vegetables allowing for a longer growing period, and thus increased food security and potential to generate additional income for smallholder farmers.

<sup>3</sup> <https://mongolia.un.org/en/264825-mongolia-dzud-response-plan-march-2024-update>

<sup>4</sup> <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyneedsassessmentadaptation-mongolia-13.pdf>

<sup>5</sup> <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyneedsassessmentadaptation-mongolia-13.pdf> (page 23)

<sup>6</sup> Ministry of Environment and Tourism. 2014. Mongolia Second Assessment Report on Climate Change 2014. MARCC. pp. 1-302

Smallholder vegetable farmers in the two provinces currently rely on rainfall, surface water or mostly water from wells for irrigation. However, both surface water resources and water wells are drying up. This combined with deeper groundwater levels and a drop in functioning wells, mainly due the collapse of the country state systems to maintain and renovate water infrastructure, is placing smallholder farmers in a vulnerable situation. With the rising number of hot spells during critical stages of crop growth, decrease in rainfall, and lack of appropriate technologies and practices, these smallholder farmers are unable to sustain optimal vegetable production.

Where it exists, **irrigation infrastructure** is traditional and runs on diesel. As yet, solar powered irrigation solutions have not been introduced into the country due to lack of policies, technology support and financial capacities of existing private sector technology providers and related supply chains. The business case opportunity for solar irrigation solutions has yet to be developed, and a supporting national policy framework/incentive structure is lacking. Furthermore, sustainable water management practices including drip irrigation – usually used in tandem with solar irrigation solutions – is still not widely used. One of the main constrains is access to finance.

**Greenhouse vegetable farming** is not prevalent in the country due to the lack of technical support and financing for smallholder vegetable farmers. Where assembled, the greenhouses are rudimentary and subject to wear due to the severe weather conditions. There is no support to maintenance the greenhouses and funds for repairs are not accessible.

In parallel, **agroforestry** is not a mainstreamed practice for smallholders in Mongolia. According to the country’s TNA<sup>7</sup>, while the practice was successfully implemented during the 1980s reaching 1.5% of the total agricultural land with forest protection strips, it was stopped during 1990s due to social and economic hardships in the transition period and previous forest strips were cut down and destroyed. According to the TNA, forest strips can increase vegetable production by 50-70 %. These practices could protect arable land from climate change impacts by limiting soil degradation, supporting better retention of water as well as providing shade and cooling for growing vegetables. Furthermore, the TNA has indicated that forest strips will reduce soil erosion due to wind on arable land and protect infrastructure such as greenhouses and drop irrigation. The wind speeds in the two selected provinces are some of the highest in Mongolia. The average wind speed in the Dundgobi province is 4.2 m/s, the absolute maximum speed of 36 m/s is in the Autumn and 28 m/s in the Spring, which occur 25-31 days a year. In Arvaikheer, Uvurkhangai province the average wind speed is 2.5 m/s, and the absolute maximum wind speed is more than 10 m/s with occurrences of 6-7 days a year. In both places, the prevailing wind is North and Northwest.<sup>8</sup> In addition to the above, some agroforestry practices, such as planting of orchards, could be an additional source of revenue for smallholder farmers.

**Insurance** can be an effective risk management tool to compensate smallholder farmers for climate-related economic damages. The Government of Mongolia prioritised developing an insurance product for the livestock industry as accounts for about 90 percent of agricultural production and employs 1 in 4 Mongolians—more than any other sector. An index-based livestock insurance was launched nationally in 2012 by the Government of Mongolia. The insurance scheme is currently implemented by Mongolian Re, which is the sole domestic national reinsurer in the country.<sup>9</sup> During a mission conducted in February 2024, feedback from smallholder farmers in

<sup>7</sup> <https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyneedsassessmentadaptation-mongolia-13.pdf>

<sup>8</sup> Weather bulletin of the Dundgobi and Uvurkhangai province, in Mongolian

<sup>9</sup> Greening Growth in Mongolia (imf.org)

Dundgobi indicated that this insurance mechanism does not work for farmers who have small livestock holdings. Hence although this insurance mechanism is seen as successful in Mongolia, there seems to be differing opinions when the smallholder voice is heard. The implication is that there could be important lessons to be learnt from this insurance scheme whilst designing a new one for vegetable farmers.

A wheat insurance product was developed by Mongolian Re in 2015, and remains the only crop insurance product in the market. There are key challenges in the provision of insurance to the crop sector that have yet to be addressed. Wheat (and crop production in general) production is perceived as a high risk business resulting in high premium rates that are unaffordable for smallholder farmers. Most smallholders already have the financial strain of bank loan repayments, maintenance of their business and family needs. In addition, insurance companies need to conduct field inspections about 3-5 times a year for underwriting and loss adjustment, which increases operational costs of the insurance scheme. Furthermore, the legal environment for crop insurance is still being developed, and needs to be fast tracked into an independent crop insurance law.

Private sector insurance players such as Tenger Insurance have expressed an interest to enter this market if a conducive legal framework was to be developed. Mongolian Re has also expressed an interest to support the development of a digitalised insurance scheme for smallholder vegetable farmers. This organisation would be able to draw from lessons learnt in setting up similar schemes in the country and best practices from other developing countries. The insurance sector in Mongolia currently lacks the capacity to design such schemes and requires support in conceptualising, designing and implementing an insurance product for smallholders.

During the mission, conducted in February 2024, over 20 smallholder farmers were interviewed. Received responses have indicated that there is a strong demand from the smallholder farmers to access (1) insurance to cover their losses during extreme climatic events (2) financing to improve the vegetable farming practices, including integration of climate resilient activities, irrigation and greenhouses (3) mechanisms by which farming groups could be created to increase scale and facilitate financing and lower risks related to vegetable farming (4) incorporate a health insurance link to an insurance product to support family welfare (5) cooperate on government led schemes such as the farmer database from MET and provincial level training. Annex D provides the raw data collected from farmers supporting the above points.

### No3

**Past and on-going efforts to address the problem** (up to half a page):

*This section should answer the question “what has been done or is currently being done to address the problem?” Please describe past and on-going processes, projects or initiatives implemented in the country or region to tackle the climate problem as described above.*

The government of Mongolia is keen to address the identified problem with climate change adaptation interventions, improved agriculture development and productivity, and increased reforestation/forestry activities. The country’s policy framework and public sector investments prioritize these areas. However, there is a lack of national capacity and resources to design an integrated solution to implement these interventions. Although solar powered irrigation systems, greenhouse vegetable farming practices, agroforestry and insurance products for agriculture are well developed in other parts of the world, including in some developing countries, Mongolia is still

struggling to bring these solutions to its people. Where initiatives do exist, there is no fungibility amongst them and there lacks an exit strategy for financing once the initiative has ended. A digitalized approach to integrating the various components of the solution could be a way to increase efficiency, decrease costs, improve monitoring, replicate and scale.

**Climate Change Adaptation**

Mongolia’s Nationally Determined Contributions (NDC, November 2019 – to be updated in 2025) includes an adaptation component, highlighting the country’s need to overcome negative impacts of climate change, and strengthen resilience of ecosystems and socioeconomic sectors. The country National Adaptation Plan (NAP) is currently under development, with support from the Green Climate Fund (GCF) and UN Environment Programme. The Government of Mongolia has finalized the NDC implementation plan, which prioritizes sector-specific mitigation and adaptation measures. Areas of national priority for adaptation planning in Mongolia include arable farming, water and forestry resources management, and biodiversity.

**Agriculture**

The Policy on Food and Agriculture (2015) has set a goal of intensifying vegetable production. This policy emphasizes the need to strengthen agricultural productivity and production management through the value chain method, adaptation to climate change, and empowerment of farmers. By supporting initiatives such as greenhouse farming, water-saving drip irrigation system, and mechanization of agriculture, the government is working on a target to meet 70 percent of domestic needs for vegetables by 2020 and 100 percent by 2025. Policies prioritizing smallholder farming offer an enabling environment for meeting these targets.

Following on from Mongolia's National Programme for Food Security (2009-2016), the government intends to enhance water productivity and expand the country's irrigated land from 54,000 ha in 2019 to 120,000 ha by 2030. <sup>10</sup>As of today, 1190 enterprises, 34.5 thousand family farmers, more than 65.0 thousand farmers, mechanizers, and fruit growers are operating in a total of 706,000 hectares of agricultural land. Although the Government targets are ambitious, they will not meet the need of all farmers in the country. There are two government-based programmes for agriculture - Cereals, potatoes and vegetables National Program (2017-2022) and the Fruits and Berries Program (2018-2022).

In addition to the above, drip irrigation systems were first introduced in Mongolia in 2004 and experimental research work was started. This technology is very suitable for regions that are vulnerable to climate change and lack surface water resources. However, the technology has failed to be mainstreamed into agricultural production. In addition to the efficient use of water, there are research results that indicate an increase in yield by 2.4 times when the technology is applied to cultivated plants in combination with fertilizers making the farming activities more investible.

**Reforestation**

The Program of the Government of Mongolia for 2020-2024 created a legal environment to provide monetary incentives to individuals and business entities who have contributed to green development by planting trees. It is unclear on how these programmes will be continued post 2024. The president of Mongolia, Khurelsukh Ukhnaa, launched a nationwide movement in 2021 to plant 1 billion trees by 2030 as part of Mongolia’s commitment to the United Nations Sustainable Development Goals, as well as a way to fight desertification, deforestation, and food insecurity. As

<sup>10</sup> <https://www.adb.org/projects/51423-002/main>

of June 2022, 21 provinces (aimags) and 330 sub-provinces (sum) are participating in the seedling process.

The Agriculture Support Fund, financed by the Government of Mongolia, has a few financing programmes to support agriculture and reforestation. The fund will support forest strips by providing 2-year-old seedlings to farmers— first at 30% of the commercial price and then at full price. The fund currently provides loans to SMEs for drip irrigation at no upfront cost, an 8-year tenor and at 1.37%per annum. The fund also acts as a technology transfer hub, and could play a crucial role in disseminating new technologies such as solar powered irrigation systems.

**Greenhouses for vegetable farming**

Due to the long and severe Mongolian winters, the optimal season for growing frost sensitive plants in the open is about 4 months. For the rest of the year greenhouse infrastructure would greatly protect and thus lengthen the productivity of these plants. There are a few initiatives, mentioned here, that could be built upon. The Asian Development Bank (ADB) has a few programmes that focus on Community Vegetable Farming for Livelihood Improvement that aims to introduce a community farming model, applying improved climate-resilient farming practices (including greenhouses and improved irrigation), strengthening farm-to-market linkages, and integrating farming groups into inclusive agriculture value chains.<sup>11 12</sup> These are pilots that need to link to other programmes such as those implemented by FAO and GERES, and to an innovative insurance scheme for the smallholder farmers.

GERES, the Foundation, with its partners aimed to increase food security and income in the Arkhangai and Khentii provinces by helping develop quality vegetable production disseminated passive solar greenhouses (PSGH). While this pilot positively impacted the target communities , it lacked financial sustainability beyond the project lifetime and did not linkup with other similar pilots in Mongolia.<sup>13</sup>

FAO is leading the implementation of a project to enhance production and market access of vegetables to support economic diversification funded by the United States Agency for International Development (USAID). The project is conducting a baseline study in Darkhan, Selenge, Khovd and Tuv aimags, and will be implemented in selected locations for three years from 2023 to 2026. Within the framework of the project, energy-efficient, long-harvest, medium-sized greenhouses will be established in selected locations. It is important to link-up with these initiatives to create an integrated programme for Mongolia.<sup>14</sup>

**Database for Crop Farmers – digitalized insurance scheme**

Vegetable farming in Mongolia is considered a high risk and low return activity. This is mostly due to the highly variable climatic conditions, made more extreme by the changing climate. In addition, there is lack of support to provide smallholders guidance on climate resilient practices (agroforestry based and other), irrigation and greenhouse infrastructure solutions, and access to financing. The situation is worsened by the absence of a financial safety net should smallholders lose their crop and income to an extreme climatic event. Given that vegetable farming can increase food security in Mongolia, and provide vulnerable communities with an additional source of income, it is justified to propose the development of a digitalized insurance product that covers such losses. Digitizing an

<sup>11</sup> <https://www.adb.org/projects/50278-001/main>

<sup>12</sup> <https://www.adb.org/sites/default/files/linked-documents/51423-002-sd-03.pdf>

<sup>13</sup> <https://www.louisdreyfusfoundation.org/projects/micro-farming/projects/Solar-greenhouses-for-sustainable-agriculture>

<sup>14</sup> <https://www.fao.org/mongolia/news/detail-events/en/c/1649550/>

insurance product would allow for innovation such as Picture Based Insurance (currently being piloted in Kenya and Uganda), and integrated solutions that link to farmer databases and weather forecast systems.

The Ministry of Food Agriculture and Light Industry launched a database in late 2022 for crop and vegetable farmers. Farmers that input their information into the database qualify for incentives provided by the Agriculture Support Fund. For example, vegetable smallholders are provided an 80% discount on seeds (with receipts), and favorable loan conditions amongst other incentives. About 9000 vegetable farmers have already placed their details into the database. Such a farmer database could dovetail with the design of a digitalized insurance scheme, monitoring for agroforestry/forest strip projects, concessional credit provision and act as a platform to identify and manage potential community farming structures. Furthermore, the mobile telecommunications network in Mongolia covers 95 percent of the population and 2.3 million users (69.1%) have smart phones. This network can be harnessed to design insurance solutions with greater reach and monitoring accuracy. For example, Picture Based Insurance (PBI) is based on monitoring damages that cannot be captured by satellite data and soil moisture-based data. However legal frameworks, such as cooperation agreements between Mobile network operators (MNOs) and insurance companies in Mongolia will need to be considered.

Risk mitigation instruments for climate change are not available for smallholder vegetable farmers. TheCredit Guarantee Fund of Mongolia is one of the few schemes available but is focused only on SMEs. The fund assists SME financing by guaranteeing loan repayment to banks and other loan providers.

#### No4

##### Specific technology<sup>15</sup> barriers (up to one page):

*This section should answer the questions “what are the technology barriers that hinder national efforts described above” and “how will the technology concept complement these efforts?” Building upon the problem statement and taking into consideration the existing efforts described above, please describe the specific technology barriers encountered by the applicant to identify, assess or deploy climate technology(ies) in an effort to address the problem statement. The described barriers should be within the scope of the technology concept (described in the section below).*

The identified barriers to the wide adoption of the appropriate adaptation solutions to reduce smallholder farmers vulnerability to increased drought, extreme temperature, flood and strong wind affecting vegetable production are the following:

##### Financial Barriers

- High capital cost of drip irrigation equipment and storage facilities. There is no manufacturing of solar powered drip irrigation systems in the country, and equipment and supplies are imported from other countries.
- Limited access to long term soft loans and other forms of finance. The cost of financing is high, with limited access and unattractive conditions – including interest rates and loan tenor. The

<sup>15</sup> “any equipment, techniques, practical knowledge and skills needed for reducing greenhouse gas emissions and adapting to climate change” (Special Report on Technology Transfer, IPCC, 2000)

Agriculture Support Fund, although impactful, is struggling with capitalisation and ability to scale.

- High interest rates. Banks in Mongolia charge high interest rates for customers applying for climate technology loans compared to more conventional technologies e.g. diesel powered generators. This high interest rate affects the financial feasibility of these technologies, including for irrigation and forestry, that have high capital costs to begin with. In addition, the terms of the loans are not conducive to the type of technology and risk including shorter tenure periods and lack of any grace periods. The average annual interest rate of loans from commercial banks in Mongolia over the past 3 years (2019-2021) was 15.3%, which makes it difficult for smallholder farmers, who run household farms and seasonal production, to get a loan.
- Lack of creditworthiness and affordability of smallholder farmers. Even if a smallholder farmer can pay for a product and/or service, there might not be a willingness to pay for it due to the higher risks and a lack of knowledge of the product benefits.
- Lack of risk mitigation instruments. There is a lack of risk transfer and risk sharing markets due to the underdeveloped capital markets in Mongolia. The development of these markets is restrained by low data accessibility and quality, lack of expertise and financing. This increases both the risk of borrowing and lending, which further decreases the confidence of the private sector to invest in new irrigation technologies. Specifically for crop-based agriculture, insurance products are not available to smallholder farmers that could provide cover for the increasing crop damage due to climate change accelerated events. Financial institutions are generally risk averse unless such products exist to mitigate smallholder losses, and protect their investments. Insurance companies perceive insurance products for smallholders as high risk and high cost due to the operational requirements, including frequent travel to remote areas to collect data.
- Higher transaction costs for transacting in rural areas. Sparse populations and weak infrastructure often result in higher transaction costs for financial institutions requiring greater incentives to work in remote rural areas such as in the two target provinces.

#### Knowledge and Capacity Barriers

- Limited knowledge and skills. Farmers do not have sufficient know-how to use new water saving equipment such as drip irrigation which negatively affects confidence in the technology – both for the farmers and potential investors/financial institutions.
- Lack of training, demonstrations and pilots of new irrigation technologies. There are few research and practical experiments on vegetable varieties, irrigation norms, standards, and soil characteristics, including the planting of forest strips around arable land. However, application of research and science in practice is very weak and does not often translate from science based techniques to practical application, even if guidelines are available.
- Risk of maladaptation. If solar powered irrigation solutions are not appropriately used, it could lead to depletion of underground water reserves as solar powered irrigation is sometimes seen as a cost-free technology, unless the water is metered and costed. Sustainable water management practices will need to be deployed based on technical assessments of water resources and projected climate change impacts on them.
- Lack of knowledge on available greenhouse infrastructure. Options for improved greenhouse structures exist, for example a 'Mongolian Window' greenhouse that is currently used widely in South Korea that is designed with the Mongolian Ger-style window for ventilation control. However one of the few that have been built in the two study provinces has been done by a farmer on his own initiative, and financing. Having built the greenhouse, he now lacks financing for irrigation. Such proactive innovation needs to be encouraged, supported and replicated.

**Socio-Economic Barriers**

- Low uptake of cooperative structures and farmer grouping schemes. There is an absence of appropriate farmer grouping schemes which could support individual farmers with low credit ratings by offsetting the financial risks associated with loans and required collateral. In Mongolia, SMEs make up 98% of all enterprises, three-quarters of which are microenterprises. While Mongolian SMEs face many obstacles to unlocking their full potential, 30% cite lack of access to finance as the foremost constraint. Only 10% of about 37,000 Mongolian SMEs regularly access finance through banks and other sources.

**Policy Barriers**

- Lack of financial incentives and subsidy programmes. There are lack of appropriate policies to encourage new solar powered irrigation systems. For example, a tax exemption policy for importers of solar and drip irrigation equipment.
- Small land-holding sizes and unfavourable land tenure systems. The land tenure systems in Mongolia, especially for fruits, vegetables and berries dominated by smallholder farmers, are not always clear and thus deters farmers from making long-term investments on land. In addition, land fragmentation due to small pieces of land belonging to different households, and nomadic lifestyles, do make make it economically viable to invest in new technologies and practices

**Sectors:**

*Please indicate the main sector(s) related to the technology concept:*

<input checked="" type="checkbox"/> Agriculture	<input type="checkbox"/> Coastal zone management	<input type="checkbox"/> Disaster risk reduction	<input checked="" type="checkbox"/> Food security
<input checked="" type="checkbox"/> Forests	<input type="checkbox"/> Human health	<input type="checkbox"/> Marine and fishery	<input checked="" type="checkbox"/> Rural development (resilience)
<input type="checkbox"/> Urban development (resilience)	<input checked="" type="checkbox"/> Water management		

*Please add other relevant sectors:*

**Cross-sectoral enablers and approaches:**

*Please indicate the main cross-sectoral enablers and approaches:*

<input checked="" type="checkbox"/> Communication and awareness	<input checked="" type="checkbox"/> Economics and financial decision-making	<input type="checkbox"/> Governance and planning	<input checked="" type="checkbox"/> Community based
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<input type="checkbox"/> Disaster risk reduction	<input checked="" type="checkbox"/> Ecosystems and biodiversity	<input checked="" type="checkbox"/> Gender
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**No5**

**Technology concept requested (up to one page):**

*Founded on the problem statement, past/on-going efforts and technology barriers, please describe the technology concept. The technology concept should clearly contribute to adaptation to climate change as described in the problem statement and contribute to overcome the specific technology barriers.*

*Within a clearly defined scope, the description of the technology concept should be structured into the following:*

- Overall objective
- Anticipated groups of activities to be performed by the micro-grants project
- Anticipated products to be delivered by the micro-grants project

*Please note that UNEP-CTCN facilitates technical assistance and is not a project financing mechanism.*

Overall objective: The objective of this technology concept is to support vegetable smallholder farmers in two provinces in Mongolia to adapt to climate change by providing a bankable proof of technology concept for solar powered irrigation and agroforestry as an ecosystem-based approach for better water resource management. To support this solution, a digital based crop insurance product will be developed for smallholders, to fill the current gap for damage protection and financial instruments for investment risk mitigation.

This ecosystem-based adaptation approach will enable vulnerable smallholder farmers to improve vegetable productivity on their land, increasing their incomes and food security, supporting the country to meet its vegetable demands from national supply. It will create an enabling environment to enable the uptake and dissemination of grey and green technology solutions namely irrigation, greenhouse infrastructure and agroforestry practices amongst vulnerable smallholder farmers of the two targeted provinces.

This would include identifying available technology options best suited to smallholder farmers, establishing a policy framework to drive the setting of standards and certification, establishing financing structures to extend credit and reach the smallholder farmer as well as rolling-out training modules targeted at players across the supply chain. These financial structures will be secured by further engaging with networks through the NDC Action project, and with relevant partnership agreements and memorandum of understanding (MoU) documents in place with key public and private sector stakeholders. Access to finance for smallholder farmers will be enabled by exploring how index-based insurance products can effectively address the financing challenges faced by vegetable farmers, including serving as collateral for accessing credit from financial institutions.

To achieve the objective, the project will be divided into the four following pillars: (1) technology options that are best suited to vegetable farming (irrigation, agroforestry practices, greenhouses) (2) policy framework for technology standards and certification (3) viable financing options for smallholder farmers (4) and capacity building for key users and providers of the technology. All four components will include stakeholder consultations as a key part of the process, building on the

extensive stakeholder mapping and consultations that have already been conducted to prepare this concept.

**Pillar 1: Technology options, including a cost-benefit analysis.**

This component will first identify solar powered irrigation options – including smart drip irrigation technology -including a cost-benefit assessment for each option. As solar powered irrigation is still a new concept for agriculture in Mongolia, the required assessment to investigate options to import the technology will be considered. Potential private technology providers of conventional irrigation services in Mongolia – some of whom have already been contacted and have indicated interest in expanding their services – will be consulted, in addition to other key stakeholders such those in technology distribution networks.

A key aspect in the consideration of technology options is the avoidance of maladaptation practices which could lead to overuse of water and depletion of available surface and underground water resources. In order to inform the choice of technology options, a study of water resources will be conducted to ensure that water pumped through newly introduced irrigation schemes remain under the current and future levels of water recharge. This will allow sustainable management of water resources in the two provinces and ensure long term ecosystem and socio-economic benefits. Most areas in Mongolia, including the two provinces selected for this concept note do not have these detailed studies of underground water resources. The suggestions in this concept could potentially be replicated across other relevant provinces, paving the way to further expand the technology options across the country.

The second part of this component will look at the feasibility of combining agroforestry practices with irrigation in vegetable farming, particularly with a view to aggregating tree planting activities and contribute to the Government of Mongolia’s one billion tree initiative. Trees have strong adaptation potential through the wide range of ecosystem services they deliver. When used in combination with agriculture and irrigation, they can provide protection against strong winds, shade, cooling effects to the crops while supporting water infiltration, soil absorption and therefore increasing water recharge. This feasibility study on agro-forestry will assess and highlight those benefits for smallholder vegetable farmers. It will include field surveys in provinces and soums, selection of appropriate vegetable production areas, and identification of cooperatives and farming associations. The Voluntary Carbon Market, and potential generate carbon credits as an additional source of revenue will be considered. In addition, the potential to collaborate with the private sector to be involved in the tree planting activities – both for corporate social responsibility (CSR) goals and as a business opportunity – will be explored.

These conversations have already been initiated e.g. with a mining company, Erdenes Tavan Tolgoi, that has a plan to plant 180 mn trees in 9 years and has already begun a feasibility assessment to plant forest strips around 20 hectares of agriculture land. Till date, 21 large corporations such as, Oyu Tolgoi, Tavan Tolgoi, Energy Resource, and Erdenet Mining Corporation have signed government contracts and pledged to plant 608.5 million trees in the country. There is a huge opportunity to combine this ambition with the agroforestry potential for smallholder vegetable farmers. There is also a keen interest from the private sector to explore Voluntary Carbon Market potential, of which there is little knowledge.

**Pillar 2: Policy and legislature for technology standards and certification.**

National guidelines on solar powered irrigation technologies need to be put in place to encourage the supply and use of high-quality technology and sustainable practices and encourage those private sector entrepreneurs and/or technology manufacturers who meet these requirements. The market is nascent and lacks a framework to ensure a quality driven approach for uptake and dissemination of the relevant technology and practices. The national guidelines need to be accompanied by implementation recommendations including water pumping thresholds developed closely with Ministries, Department and Agencies that will be responsible for its enforcement.

**Pillar 3: Financing structure to roll out sustainable irrigation and agroforestry practices integrated with greenhouse infrastructure and other climate resilient agroecology practices.**

To address the lack of financing for these climate adaptation technologies, which are perceived as new and high risk, it is essential to follow activities (1) and (2) with a blended finance investment mechanism. There are inadequate credit lines and other financial products in the country for smallholder farmers to access. Microfinance institutions are not able to fill this gap, even with a large SME sector that is keen to expand their businesses. Both solar powered irrigation systems and agroforestry require relatively high upfront investment costs, which will require some levels of grant funding to de-risk the projects. However, pure grant funding from donor programmes and the public sector for pilots will not ensure the set-up of a sustainable financing mechanism to allow for the scaled-up implementation of the adaptation options. This activity will set-up a sustainable financing mechanism that addresses financing barriers for the proposed climate adaptation technology solutions whilst still bridging the gap during the initial development phase with a 'buffer grant fund'. This would also consider existing and new guarantee products that would further de-risk investments.

The Mongolian financial sector consists of 14 commercial banks, 17 insurance companies, 508 registered non-bank financial institutions (NBFIs), and about 286 savings and credit cooperatives (SCCs). Initial discussions with a wide set of financial institutions including with the Khan Bank and the Trade and Development Bank of Mongolia, has indicated keen interest to participate in a financing facility targeted at climate adaptation measures. This stems partly from the recent launch of the Green Banking Principles in the country, and frantic shift that banks are trying to make in that direction. It is an opportunity that has to be built upon. Currently, microfinance providers in Mongolia are NBFIs and SCCs. However, the largest microfinance providers are commercial banks in Mongolia. Despite a significant number of initial challenges such as insolvent banks, low saving rate, lack of legal environment, and lack of institution, microfinance in Mongolia has achieved considerable success. Khan Bank and XacBank are two main recognized banks in the area of microfinance. The law on Savings and Cooperatives (2014) stipulates the legal and regulatory

framework that governs SCCs and its operations in Mongolia. This law will need to be considered in the design of community farming models for vegetable smallholder farmers. In the financial sector in Mongolia, banks are the most prominent in taking risks to introducing new technologies. Currently, Mongolian banks have been offering services based on advanced digital technologies such as mobile banking and internet banking.

The Agriculture Support Fund currently provides most of the technical assistance and delivery of subsidy schemes to the agriculture sector, and is eager to collaborate on a financing facility as the participating government entity through which potential subsidies could be channelled and blended with additional finance. The Agriculture Support Fund work closely with the Ministry of Finance in Mongolia, and to implement policy measures (including a side set of fiscal incentives) for the agriculture sector. Furthermore, a specific financing structure that could be considered has been already discussed with the Mongolia Sustainable Finance Association (MSFA), which could be modelled along the lines of a successful Green Climate Fund (GCF) approved financing facility for energy efficiency in Mongolia. The MSFA is currently managing this facility and has several suggestions on how to adapt it for the identified adaptation technology options and to involve the extensive banking network of the association. MSFA is also the Fund Manager for a Green billion tree fund – in partnership with banks and central bank – and is struggling to find aggregated forestry-based pipelines in which to invest. These are just a few of the discussions held – the entire list of stakeholders and consultations will be made available to CTCN implementing partners. The aim would be to potentially provide a one-stop-shop for financial assistance, investment and the prioritised adaptation technology options housed with an appropriate entity. Once the proof of concept and business case for the facility has been established and taken into implementation, it could be further expanded to other provinces in Mongolia, and to other adaptation technology options. It would be the first such facility in Mongolia to provide blended finance for climate adaptation.

Whilst conducting the consultations for the financing pillar, a repeated concern from stakeholders is the lack of a crop insurance product in Mongolia for smallholders. As smallholder farmers currently have no access to crop insurance, they are highly susceptible to the impacts of climate change. Financing institutions have expressed that providing loans to such smallholders is seen as a high risk investment, for which a suitable risk mitigation instrument is not available. The Ministry of Environment and Tourism is keen to look at ways in which crop insurance can support smallholders access financing whilst also providing protection from crop losses and therefore building resilience. Crop insurance would be a new product for smallholder farmers in Mongolia – currently only livestock insurance and wheat insurance for crops is available. Advances in digitally supported technology solutions for insurance could offer a transparent and cost-effective way to support smallholders access insurance and have fair, timely payouts when there is a climate driven event. Existing options for digital intervention will be assessed including:

- **Remote Sensing and Satellite Technology** : are pivotal in modern agriculture and crop insurance, offering a wealth of detailed data and insights. High-resolution satellite imagery, captured by advanced sensors in orbit, provides invaluable information about crop health, growth patterns, and potential issues like pest infestations or drought stress. Drones, equipped with specialized cameras and sensors, complement this by offering on-demand, fine-grained data at lower altitudes, ideal for localized assessments and damage monitoring. Remote sensing technologies, including multispectral sensors, extend our vision beyond the visible spectrum, helping detect crop stress or disease early. These technologies play a vital role in damage assessment, helping insurers rapidly identify

affected areas after events like storms or pests. Moreover, they validate insurance claims by objectively comparing pre- and post-event imagery, ensuring accurate and fair payouts. Overall, remote sensing and satellite technology enhance crop insurance by providing real-time, data-driven insights that enable swift responses to loss events and support the resilience of agriculture in the face of various challenges. Mongolia is still far behind when it comes to applying this technology, with low capacity both in the public and private sector to use it.

- **Artificial Intelligence (AI) and machine learning** play a pivotal role in crop insurance across various key areas. Firstly, they enhance risk assessment by analyzing diverse data, including historical crop records, weather patterns, soil quality, and geographic data, enabling insurers to tailor policies precisely to each farmer's unique circumstances. Secondly, AI-driven automation expedites claims processing through real-time verification using sources like weather stations and satellite imagery, reducing payout waiting times. Furthermore, AI excels at fraud detection by identifying suspicious patterns and anomalies in historical claims data, enhancing the integrity of insurance pools. Additionally, AI's data analysis capabilities empower insurers to make more accurate predictions by processing extensive datasets, such as weather and soil information. Lastly, AI enables the creation of personalized insurance policies, considering individual farming practices, crop types, and locations, benefiting both farmers and insurers by aligning premiums with risk exposure.
- **Picture-Based Insurance**, employs smartphones, remote sensing, and data digitization to address the challenges associated with traditional indemnity-based crop insurance. In this system, a farmer installs a smartphone app and uses it to capture photos of the crop parcel they wish to insure at multiple points during the growing season, ensuring consistency in location and viewpoint through geotags and visual guides. These photos are securely uploaded to a server, preventing tampering. At season's end, experts analyze the images to assess crop growth and estimate damage percentages. Insurance claims are verified using these assessments, leading to payouts for farmers. Researchers are also exploring the use of artificial intelligence (AI) and machine learning to simplify photo interpretation. Additionally, PBI can help mitigate basis risk issues associated with index-based insurance, potentially allowing farmers to claim compensation for losses not covered by the local index product when they provide photo evidence of crop damage throughout the season.
- **Internet of Things (IoT) technology** refers to a network of interconnected devices and everyday objects capable of sending and receiving data. Although its development, particularly in low- and middle-income countries (LMICs), is in its early stages, IoT holds significant potential to revolutionize agricultural insurance. Currently, IoT data streams primarily simplify insurance processes like underwriting and claims handling while improving customer interactions. For instance, interconnected tools like tractors can automatically measure crop attributes such as height, sturdiness, or soil moisture and transmit this data to an insurance provider. In return, the insurer can offer tailored farming recommendations to the policyholder, creating a mutually beneficial situation where crop losses are minimized, and insurance costs are lowered. The utilization of IoT in agricultural insurance is still exploratory, and its widespread adoption hinges on factors like the rate of uptake of IoT-enabled devices.
- **Blockchain Technology:** in crop insurance offers a transparent and cost-effective way to address the challenges smallholder farmers in developing countries face. It simplifies the

insurance process by using smart contracts to automate claims and payouts when predefined trigger events (e.g., adverse weather, crop failure) occur. This eliminates the need for costly intermediaries and reduces the risk of fraud. Additionally, blockchain's immutable ledger ensures that all transactions and data are tamper-proof, enhancing trust among farmers and insurers. For smallholder farmers with limited resources, blockchain enables more affordable and accessible insurance options while providing a safety net against the uncertainties of agriculture, ultimately promoting financial stability in vulnerable communities.

The assessment will look at whether these digital technologies are suitable for Mongolia and for specific smallholder vegetable farmer needs. It will also assess the relative advantages and disadvantages (e.g. block chain has received some negative reviews for its highly energy intensive nature) in their use, and potential overlaps. Examples from other countries with similar contexts will be looked at, and ways to link the digital insurance solutions to loan applications with financial institutions. Several FI's in Mongolia have already expressed interest in collaborating. There could also be options to bring in the private sector players, both from the insurance sector but also entities such as MasterCard that have digital programmes.

**Pillar 4: Training programme for key stakeholders.**

A targeted training programme needs to be developed in order to increase the confidence in the proposed climate adaptation technology solutions, including options available and how to ensure the technology is appropriately operated (grown for trees) and maintained. The programme could include demonstration sites and/or the set-up of provincial centers of excellence for the technologies, and will ensure access to standardized information across the country, working closely with equipment suppliers and other private and public sector players. The training programmes would also need to address the risk of maladaptation in the use of solar irrigation and smallholder farmers on efficient water use. It should be noted that any demonstration sites should build on existing government and/or donor led programmes, for example FAO, UNDP, GIZ and USAID have all been identified with ongoing (smaller) programs that are aligned with the proposed concept. Discussions have been held with these donor programmes, and there is a proactive interest to look at how to combine the various initiative into one umbrella solution as proposed in this concept. The stakeholder mapping done for the NDC Action project – see Annex A – would provide the basis upon which to develop a more detailed understanding of the various public and private sector partners that would need to be targeted. In addition, it is suggested that any training programme work in collaborate with relevant Government ministry programmes, such as that with the Agriculture Support Fund, to ensure the sustainability of the training programmes beyond the the project timeline. A 'train the trainers' programme could also be established along with relevant training materials and demonstration equipment.

**Pillar 5: Implementation roadmap and sustainable financing strategy**

Anticipated products to be delivered by the project: Aligned to the activities above, the following are the main products.

**Pillar 1:**

- A cost-benefit analysis and feasibility study for solar irrigation technologies, greenhouses and agroforestry practices in the two identified provinces for vegetable farmers

- A study on available water resources in the climate change context and implications for adaptation technology and practices including irrigation, greenhouses and agro-forestry
- A menu of solar irrigation technology, smart drip irrigation solutions, greenhouse infrastructure and agroforestry options integrated with climate resilient practises (with costs and functions)
- A register of solar irrigation technology suppliers/distributors, providers of greenhouse infrastructure and private sector actors interested or involved in tree planting

**Pillar 2:**

- A policy framework setting up a compliance standard and certification for solar powered irrigation solutions established including a threshold for water use based on the ground water assessments.
- Assessment of existing standards on agroforestry and tree planting developed by the University of LifeSciences in Mongolia, and suggestions to incorporate these into relevant policy frameworks

**Pillar 3:**

- A sustainable blended finance structure that can provide affordable credit to smallholder farmers established, including recommendations on its implementation. This could include the scaling up and/or combination of existing financing models, and act as an Aggregator Vehicle for project opportunities.
- Risk mitigation instruments that dovetails with the financing mechanism. Assessment of suitable crop insurance solutions – with a digital component – that brings in a partnership structure and committed partners to design and implement the solution.

**Pillar 4:**

- A training programme delivered to demonstrate technology options and provide information to key stakeholders
- At least one center of excellence/training hub established in each province, with the involvement of technology providers and universities. This funding for the center of excellence training would need to be explored and could potentially come from public Government of Mongolia with donor co-funding.

**Pillar 5:**

- An implementation roadmap and sustainable financing strategy

**No6**

**Expected timeframe:**

*Please indicate the expected duration period for the micro-grants project. Please note that the micro-grants project is limited to a maximum duration of 18 months.*

Months 1-6:

Pillar 1 started and completed.

Pillar 2 started in month 4.

Months 7-12:

Pillar 2 completed.

Pillar 3 started.

Months 12-18:

Pillar 3 completed.

Pillar 4 started and completed

Pillar 5 started and completed.

**No7**

**Anticipated gender and other co-benefits from the technology concept:**

*Please describe the activities with gender linkages as well as the anticipated gender and other co-benefits (e.g. biodiversity, economic, social, cultural, etc.) that are likely to be generated as a result of the micro-grants project.*

*For more information you can find guidelines on the CTCN's website here:*

*<https://www.ctc-n.org/technologies/ctcn-gender-mainstreaming-tool-response-plan-development>*

*Further reading on gender can be found on the CTCN website here:*

*<https://www.ctc-n.org/technology-sectors/gender>*

A report by the Economic Policy and Competitiveness Research Center (EPCRC) in Mongolia conducted in 2021 indicates that a large proportion of women are engaged in agriculture based micro-entrepreneurship programmes however do not have the financial and technical support necessary to further build their businesses. Women owned SME's represents 68% of the total number of SMEs in Mongolia, and however total amount of the financing they received in support decreased from 37.4 billion MNT in 2019 to and 9.7 billion MNT in 2022.<sup>16</sup> Specifically, 49 projects were implemented in the agriculture, forestry, and fishing sector totalling 7 billion MNT in 2019 which was just 18% of total investments for the projects<sup>17</sup>. In 2020, women entrepreneurs implemented 9 projects for potatoes, vegetables and fruits with loans totalling 0.9 billion MNT which is 9% of the total loans in that year. In 2019, number of female employees in the agricultural sector was 126.297 which represented 43.5% of the total employment. The report also indicated that more women-entrepreneurs applied for loans (40 per cent versus 33 per cent for men) and that the loan approval rate was higher for women-entrepreneurs (86 per cent) than for their male counterparts (73.9 per cent).

The implementation of this project will increase the participation of women in the agricultural sector in the study provinces, acting as an example for other provinces in Mongolia. For example, by consolidating several entrepreneurs in the Uvurkhangai province, the project will support women entrepreneurs move from micro- entrepreneurs (1-10 individuals) to small-sized (10-50

<sup>16</sup> Mongolian SME development agency

<sup>17</sup> Gender Statistics assessment on entrepreneurship in Mongolia. 2021. Economic Policy and Competitiveness Research Center (EPCRC); p26, Table 8

individuals) entrepreneurs, which could triple the income of households from the agricultural sector.<sup>18</sup>

An example of a women led micro-entrepreneurship programmes that could be incorporated and scaled as part of the project is from the Dundgobi province where 13 female volunteers established an eco-cooperative called the "Zagiin Alim" (Saxaul Apple) on vegetable farming to build a green structure on 2 hectares of land on May 5th, 2022. The main goal of the cooperative is to contribute to the national policy implementation process on reduction of pasture degradation and to ensure food security. Their activities include creation of a green belt by planting woody plants (sedge, aspen, elm, fir, and pine trees), to grow animal feed plants, plus potatoes, and vegetables. As of today, the "Zagiin Alim" cooperative is grows vegetables (lettuce, spinach, silverbeet, cauliflower, sprouts and broccoli etc.) in two greenhouses; potatoes and other vegetables on 0.5 ha of land , and are in the process of planting 300 sea buckthorn seedlings, 50 cycads, 350 elms, and 350 poplars as part of an agroforestry initiative.

**№8**



**Key stakeholders:**

*Please list the stakeholders who will be involved in the implementation of the micro-grants project and describe their role during the implementation (for example, government agencies and ministries, academic institutions and universities, private sector, community organisations, civil society, etc.).*

Leading up to the scoping for this concept, an extensive list of stakeholders has already been consulted. All those consulted stakeholders, including financial institutions are keen to collaborate with the Government of Mongolia on this opportunity. This initial set of stakeholder consultations will provide a head start and advantage to carry out the different project activities and achieve the planned results. A complete list of stakeholders is available in Annex A, along with contact persons. The main stakeholder groups are listed below.

Stakeholders	Role to support the implementation of the micro-grants project
Applicant	Joint applicants are Ministry of Environment and Tourism and Ministry of Food, Agriculture and Light Industry.
Local government agencies	Province and soum governor's office responsible to support and solve the necessary land and other related issues for the operation of the project.
Smallholder farmers, farmer groups and associations	As main target group for this technical assistance, smallholder farmers and existing farmer groupings (including women associations) will be crucial in providing feedback on which solutions (technical and financial) would actually benefit them and be practically implementable.

<sup>18</sup> SME Law of Mongolia (2019).

		
<i>Academic institutions and universities</i>	<p>-The School of Agroecology of the Mongolian University of Live Sciences can provide consultation and implementation services for drip irrigation technology and forest strip.</p> <p>-School of Engineering and Technology of the Mongolian University of Live Sciences can provide consultation and implementation services for installation of solar energy and water supply.</p> <p>-Agricultural Economics and Innovation Development Center of the Mongolian University of Live Sciences can provide production management consulting services to farmers' cooperatives and groups for implementing local projects.</p>	
<i>Private sector including technology providers</i>	<p>-The "Zagiin Alim" Cooperative in Gobi-Ugtaal soum, Dundgobi Province could be responsible for the implementation of project activities on the cooperative's land.</p> <p>- Uvurkhangai province cooperative responsible for the implementation of the project in the land (small lands located in proximity) owned by 20-30 vegetable farmers of Arvaikheer soum, Uvurkhangai province.</p> <p>- Potential supply chain for solar irrigation systems – manufacturers, suppliers, distributors etc</p>	
<i>Community organizations and civil society</i>	<p>Environmental and agricultural NGOs of the province and soum will organize, ensure the engagement of local citizens in the project</p>	
<i>Financial Institutions</i>	<p>These include both the private and public sector, rural banks, microfinance institutions, informal formal financing groups etc. These financial institutions will provide a clear means by which to develop a financing structure that address barriers faced by smallholder farmers and aligns with potential financial inclusions services that can be offered.</p>	
<i>Insurance companies</i>	<p>There are 15 commercial insurance players in Mongolia – Tenger Insurance was consulted for this concept. In addition Mongolian Re – a state owned insurance company – is also keen to participate in the design of an insurance product for smallholder vegetable farmers.</p>	
<i>Development partners and key donor programmes</i>	<p>It is essential to address the fragmented nature of donor involvement in irrigation– and other - programmes by understanding where and how they function in relation to this concept, and how to leverage on any existing work and networks.</p>	



**Note – a complete list of stakeholders (over 30 and across stakeholder groups) already consulted during the identification and development of this concept is provided in Annex A below.**

**No9**

**Alignment with national priorities** (up to 2000 characters including spaces):

*Please describe how the technology concept is consistent with national climate priorities such as: Nationally Determined Contribution, national development plans, poverty reduction plans, Technology Needs Assessments, Technology Action Plans, National Adaptation Plans, sectorial strategies and plans, etc.*

Reference document (please include date of document)	Extract (please include chapter, page number, etc.).
Nationally Determined Contribution (NDC) Government resolution 47 November 19, 2019	<i>Direct alignment and contribution to NDC implementation is required. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).</i> NDC, Chapter 4, 4.3.2, Objective 2. /page 87/ Objective 2. To reduce water and irrigation costs and increase yields by introducing drip and permeation irrigation technologies in the production of irrigated potatoes, vegetables, fruits and berries.
Technology Needs Assessment, Vol.1, Climate Change Adaptation in Mongolia, 2013  <a href="https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyneedsassessmentadaptation-mongolia-13.pdf">https://tech-action.unepccc.org/wp-content/uploads/sites/2/2013/12/technologyneedsassessmentadaptation-mongolia-13.pdf</a>	One of Mongolia's priorities for climate change adaptation is "vegetable production system with drip irrigation technology (page 4). The system is a highly effective technology for improving economic, environmental and social efficiency. It contributes the most to reducing vulnerability to climate change, but medium increase employment levels. (Table 12, p38).  Another priority highlighted in the TNA is the use of forest strip protection of agriculture land (section A4 p63). The document highlights the multiple benefits of this ecosystem based adaptation approach and states that Forest strips can increase vegetables production by 50-70 %.
National Adaptation Plan Guidelines for climate change adaptation needs for private business units for all priorities and climate change scenarios, 2022 (in Mongolian)  <a href="https://ndc.mne.gov.mn/public/storage/e-resources/May2022/jnqr8OKbKbaVz8SyqBb0.pdf">https://ndc.mne.gov.mn/public/storage/e-resources/May2022/jnqr8OKbKbaVz8SyqBb0.pdf</a>	Currently, the social and economic sectors of Uvurkhangai and DundgobiDundgobi provinces, especially, the agriculture sector, are located in more vulnerable areas to climate change. In the future, it is expected to enter the most vulnerable category between 2045 and 2065 /page 23/. Any private sector organization should choose eco-friendly and less harmful equipment and technological solutions to prevent and reduce risks from climate change. It is also recommended to use technology that is resistant to extreme weather events and has high efficiency /page 26/
Add others here as relevant:	Vision - 2050 /2020/, Chapter 6: Green Development Policy, Goal 6.2 Implementation Phase 1 /2021-2030/: Protect soil fertility and moisture, prevent land degradation and desertification, restore damaged and degraded land, put into business circulation. Phase 2 /2031-2040/ Technological development will be used to protect,

	 
	<p>restore, and cultivate biological diversity, sustaining its range and habitat, and prevent depletion of resources.</p> <p>New Revival Policy /2022/ 5.2 Protect water resources, irrigate pastures</p> <p><b><u>Refer to Annex B, section on policy assessment for further details and an expanded list.</u></b></p>

**№10**

**Development of the technology concept** (up to 2000 characters including spaces):

*Please describe how the technology concept was developed at the national level and the process used by the NDE and the Designated Authority to approve the technology concept before submitting it (who initiated the process, who were the stakeholders involved and what were their roles?) and describe any consultations or other meetings that took place to develop and select the technology concept, etc.*

The technology concept development was led by the the Ministry of Environment and Tourism of Mongolia under the hub of the NDC Action Project. The Ministry prioritised four adaptation priorities of which two – solar powered irrigation systems and forest strips – were identified as having the highest potential to address climate driven water resource scarcity, potential for private sector involvement and blended finance solutions. Three assessments were conducted part of the NDC Action Project – a scoping assessment to look at potential for international and private sector sources of climate finance, a local expert driven assessment on policy frameworks and a public finance assessment (with an investment plan). These assessments will be made available to the CTCN team.

Across the assessments over 40 stakeholders were consulted from a wide range of stakeholder groups including financial institutions, government ministries, technology providers, smallholder farmers, associations, insurance companies and academic institutions (see Annex A which provides a selection of stakeholders). The response was overwhelmingly positive in supporting the selected climate adaptation solutions, and further consultations with the Ministry of Agriculture identified two provinces as target areas. Based on these initial assessments, the Ministry of Environment and Tourism decided to request additional technical assistance from CTCN Adaptation Fund Climate Innovation Accelerator (AFCIA) to put in place an enabling environment for the wide adoption of the proposed climate adaptation solutions amongst smallholder farmers starting in the two targeted provinces. The template and required contents for the CTCN Adaptation Fund Climate Innovation Accelerator was developed with the NDE - Ministry of Environment and Tourism of Mongolia, A.Naramgaravuu. Based on inputs from the review, the concept was finalised and submitted.

**№11**

**Background documents and other information relevant for the technology concept:**

Please list all relevant documents that will help UNEP-CTCN analyse the context of the technology concept and national priorities. Please note that all documents listed/provided should be mentioned in the technology concept in the relevant section(s), and that their linkages with the technology concept should be clearly indicated. For each document, please provide web-links (if available) or attach to the form. Please add any other relevant information as required.

The following references were used to develop the concept note. In addition, the attached Annex B – NDC Action Project scoping assessment – has an extended list of references that was also used to identify and substantiate findings in that document, and subsequently used to develop the basis for this concept note.

- Government of Mongolia. 2019. Mongolia's Nationally Determined Contribution to the United Nations Framework Convention on Climate Change.  
[First Submission of Mongolia's NDC.pdf \(unfccc.int\)](#)
- UNDP GCF funding proposal. 2020. Improving Adaptive Capacity and Risk Management of Rural communities in Mongolia.  
<https://www.greenclimate.fund/project/fp141>
- ADB. 2020. Overview of Mongolia's Water Resources System and Management: A Country Water Security Assessment. Manila  
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<https://unfccc.int/sites/default/files/resource/Mongolia%20BUR1%20resubmission%20and%20NIR%20CMS.pdf>
- UNDP GCF funding proposal. 2020 - Batjargal, Zambyn. Desertification in Mongolia, RALA Report 200, National Emergency Management Agency (NEMA).  
[Mongolia Country Programme | Green Climate Fund](#)
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[Mongolia. National Communication \(NC\). NC 3. | UNFCCC](#)
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[Assessment report on climate change, Mongolia | UNEP - UN Environment Programme](#)
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<http://www.fao.org/docrep/014/am616e/am616e00.pdf>
- Ministry of Environment and Tourism. 2017. Mongolia's Initial Biennial Update Report, UNFCCC.  
<https://environment.ub.gov.mn/public/files/ZG-333-2021-10-20.pdf>
- FAO (2018). Mongolia at a glance  
<http://www.fao.org/mongolia/fao-in-mongolia/mongolia-at-a-glance/en/> [accessed 21/12/2018]
- Referred to from the 'Policy assessment and recommendations on supporting the implementation of NDC Action – arable farming' by policy expert Dr. Bujidmaa Borkhuu, part of the National Technical Institute for the NDC Action Project. Document can be made available upon request.

**№12**

**Consultation with the Designated Authority of the country:**

*Please indicate whether the technology concept has been developed in consultation with the Designated Authority of the country.*

The Designated Authority of the country has been engaged in the design of the technology concept and will be involved in the further process leading to the implementation of the micro-grants project.

**Monitoring and evaluation:**

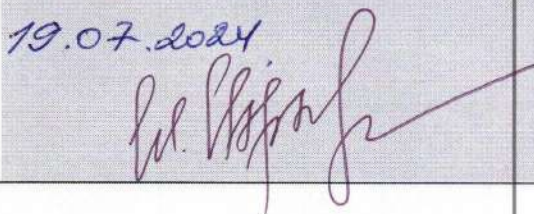
By signing this form, I affirm that processes are in place in the country to monitor and evaluate the micro-grants project funded by the Adaptation Fund through UNEP-CTCN. I understand that these processes will be explicitly identified in the Project Concept Note (response plan of the micro-grants project) and that they will be used in the country to monitor the implementation of the micro-grants project.

I understand that, after the completion of the micro-grants project, I shall support UNEP-CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

**Signature:**

NDE name: Dr. Tserendulam Shagdarsuren

Date: 19.07.2024

Signature: 



**THE COMPLETED FORM SHALL BE SUBMITTED THROUGH A WEB-LINK AS BELOW:**  
<https://www.ctc-n.org/adaptation-fund-climate-innovation-accelerator-afcia-unesp-ctcn>  
 UNEP-CTCN is available to answer all questions and provide guidance on the application process.



## Annex A

The list below provides stakeholders that were consulted.

Organisation	Contact, Designation
Ministry of Food and Agriculture and light Industry -- Agriculture Support Fund	- B. Enkhbayar, Head of law, risk, debt management department
Ministry of Finance	- Mr Sonor Luvsandorj, Head of Financial markets and insurance division, financial policy department - Undraa Nursed, Financial Markets and insurance division
Ministry of Food and Agriculture and light Industry	- Kyenjye, Senior officer Irrigated agriculture technology, Department of Crop production and policy implementation - Altangerel. B, Climate adaptation lead
Ministry of Energy	- DG, Climate Change Department
Ministry of Environment and Tourism	- Dr. Tserendulam Shagdarsuren, Director-General of the Climate Change Department, Ministry of Environment and Tourism. - B. Oyunsanaa, Director of Forest Policy and Coordination Dept
Ministry of Energy & Energy Regulatory Commission	Four participants from ERC and one from MoE - Energy Regulatory Commission - Atarjargal. Ts, Director of Energy Conservation Department, Jambaa. L (NDC Focal Point), Director of Market Research and International Cooperation; Ministry of Energy - Enkhtaivan. G (NDC Focal Point), Senior Analyst of Policy Planning Department
Ministry of Food, Agriculture and Light Industry	- D.Yesun-Erdene, Director of Agricultural Policy Implementation Coordination Department
Khan Bank	- Me Oyundelger. L, Specialist, green banking - Ms Suvd. B, Senior Green Financial Manager
Trade and Development Bank Mongolia	- Mr Badruun Dashdorj, Head / International Banking Department - Ms Maralmaa, Foreign Fund Manager and Monitoring Unit, Relationship manager
XAC bank	- Ms Galzagd Tuil, Director Eco Banking Department
Credit Risk Fund Mechanism (government provision of Guarantees)	- Tamir Erdenebat, Credit Guarantee Fund – Head of Project and Business Development Department
Mongolia Re (insurance)	- Javkhant Batmunkh, CEO - Batbayar Baasankhuu, Head of Business Development and Project Development
Mongolia Sustainable Finance Association	- Nomindari Enkhtur, Chief Executive Officer - Bilegsaikhan.B, Business Development and Partnership manager
Mongolian Bankers Association	- Sarangua Tumur, Manager, Partnerships and Public Relations
Mongolian Farmer and Flour Producers Association	- Shagdar Shinebayar, Vice President
Mongolian National Association of Fruits and Berries	- Nasanjargal Darjaa, President
Micro irrigation systems	Private sector player
Erdenes Tavantolgoi -Coal mining company	- Demberel.N, Head of Billion Tree Project

	 
FAO	- Dan Altrell, Senior Forestry Officer, Sustainable Resilient Ecosystem and Agriculture Management (STREAM) in Mongolia
GIZ	- Alina Reitz, Climate adaptation – agriculture - Mr. Munkhbayar Itgel, Advisor for Business Technology and Innovation, Promotion of Growth and Employment in the Private Sector (PROGRES)
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## Annex B

Name	Sex	Position	Amount of cultivated land (hectares)
B.Usukhjargal	female	Vegetable farmer	2.5
D.Tungalag	female	Vegetable farmer	2
O.Altangerel	male	Vegetable farmer	0.36
Tumenjargal	male	Vegetable farmer	
Erdene-Ochir	male	Vegetable farmer	
Amgalan	female	Vegetable farmer	
Adiyasuren	female	College of Technology/vegetable farmers	2
Tserendorj	female	Vegetable farmer	0.3
L.Otgontsetseg	female	Vegetable farmer	0.01
E.Otgontsetseg	female	Vegetable farmer	0.62
S.Dulamsuren	female	Vegetable farmer	0.03
U.Byambasuren	female	Vegetable farmer	0.01

**Annex C**

As attached - NDC Action Project; Arable farming sector in Mongolia: Mobilisation of International Climate Adaptation Finance, Draft Scoping Report.

**Annex D**

As attached – Rae data from smallholder farmers interviewed in the Dundgobi province.