
President's memorandum
Proposed additional financing to Mongolia
Project for Market and Pasture Management
Development (PMPMD)

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Action: The Executive Board is invited to approve the recommendation for the proposed additional financing contained in paragraph 57.

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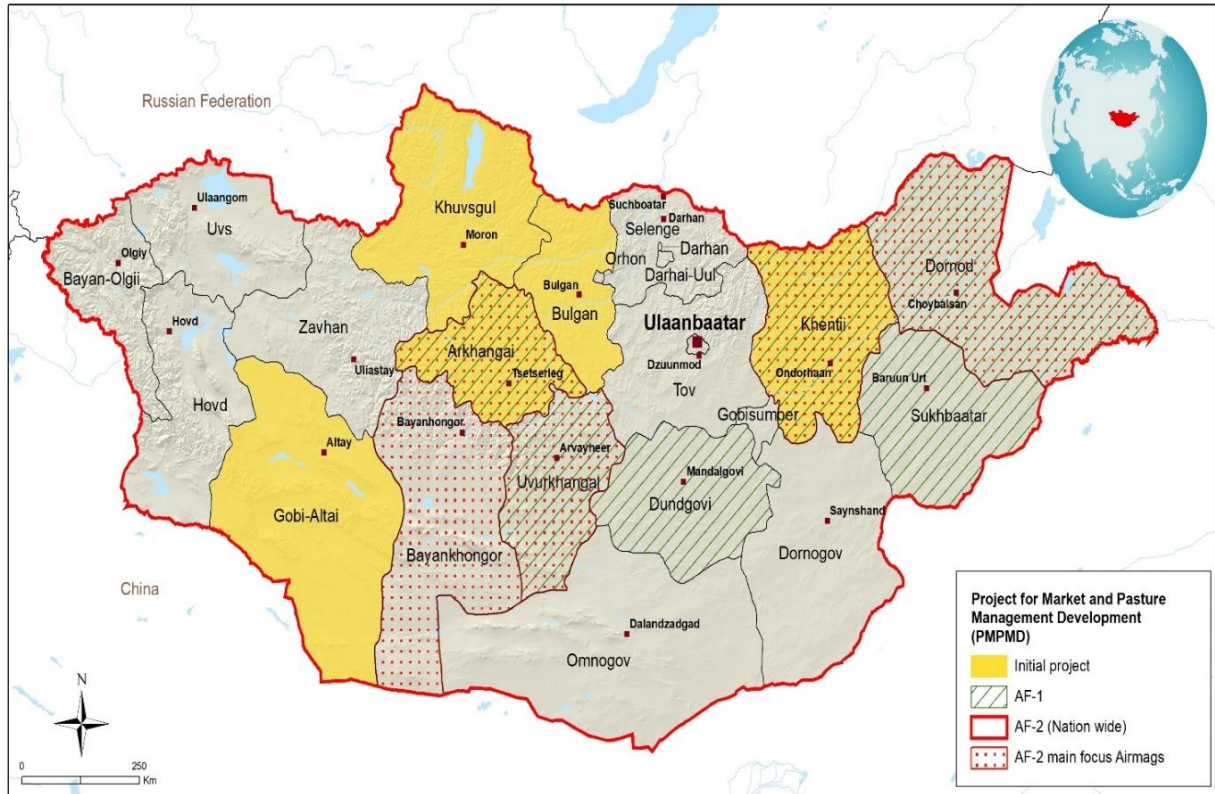
Appendices

- I. Updated logical framework incorporating the additional financing
- II. Updated summary of the economic and financial analysis

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Map of the project area



The designations employed and the presentation of the material in this map do not imply the expression of any opinion whatsoever on the part of IFAD concerning the delimitation of the frontiers or boundaries, or the authorities thereof.

Map compiled by IFAD | 28-02-2024

Financing summary

Initiating institution:	IFAD
Borrower/recipient:	Mongolia
Executing agency:	Ministry of Food, Agriculture and Light Industry
Total project cost:	US\$45.974 million
Amount of original IFAD Loan:	(i) Original loan – SDR 7.25 million (equivalent to US\$11.5 million); and (ii) Additional loan – SDR 6.48 million (equivalent to US\$9 million).
Terms of original IFAD financing:	Highly concessional for the original loan and blend for the additional loan.
Amount of additional IFAD loan:	US\$10,327,263
Amount of IFAD loan 1:	US\$3,407,997
Term of IFAD loan 1:	Blend: Twenty-five (25) years, including a grace period of 5 years, with a service charge of 0.75 per cent and an interest rate of 1.25 per cent per annum in United States dollars.
Amount of IFAD loan 2:	US\$6,919,266
Term of IFAD loan 2:	Ordinary terms: Twenty-seven (27) years, including a grace period of eight (8) years, subject to interest at a rate equal to the IFAD reference interest rate, including a variable spread.
Cofinancier(s):	United Nations Industrial Development Organization (UNIDO) and Adaptation Fund
Amount of cofinancing:	Original project: cofinancing of US\$1.5 million from the Global Environment Facility (GEF) as a grant. Additional financing: cofinancing of US\$2 million from the Adaptation Fund and US\$1.8 million from UNIDO as a grant.
Terms of cofinancing:	Grant
Contribution of borrower/recipient:	Original project: US\$2.77 million. Additional financing: US\$1.537 million.
Contribution of beneficiaries:	US\$5.4 million
Amount of additional IFAD climate financing:	US\$6,507,000 (US\$5,679,000 adaptation finance and US\$828,000 mitigation finance)
Cooperating institution:	Directly supervised by IFAD

I. Background and project description

A. Background

1. This President's memorandum requests Executive Board approval for an additional loan of US\$10.3 million for the Project for Market and Pasture Management Development (PMPMD) to fully utilize the performance-based allocation system (PBAS) allocation for Mongolia for the Twelfth Replenishment of IFAD's Resources (IFAD12). The project was approved by the Executive Board in May 2011, securing a highly concessional IFAD loan of SDR 7.25 million (equivalent to US\$11.5 million). An additional loan of SDR 6.48 million on blend terms (equivalent to US\$9 million) was subsequently approved by the Executive Board in 2016. The PMPMD has consistently delivered outstanding performance, meeting 100 per cent of its operational and financial targets in recent years.
2. In the last supervision report of 2022, key supervision and implementation support (SIS) indicator 1 – likelihood of achieving the development objective – stood at 4.82, and key SIS indicator 2 – assessment of the overall implementation performance – at 4.67. In December 2023, the project reached 100 per cent of its intended target of 136,000 people (46 per cent women) or 58,000 households.
3. Additional financing is requested to scale up the project in light of the successful mechanisms developed, among them the credit guarantee and pasture herder group (PHG) rangeland planning with local government. Scaling up at this point will make it possible to build on the existing human and social capital in communities to sustainably link groups to markets, thus providing a sustainable project exit. The additional financing has become more critical given the *dzud* (harsh winter) climate impacts during the winter of 2023–2024 and the emerging opportunities offered by the new food supply and food security policy resolution which was built in part on project results related to livestock.

B. Original project description

4. The PMPMD **goal** is to empower poor rural women and men to achieve higher incomes and sustainable improvements in their livelihoods. Its **development objective** is to reduce poverty, improve livelihoods and build climate adaptive capacities of poor herder and *soum* and *aimag* centre households in project areas.
5. The PMPMD has three components: (i) **market development** to enable livelihood development among poor households through small enterprise and microenterprise development and value chain development; (ii) **pasture management and climate change adaptation** to boost the capacity and resilience of herders to cope with climate change impacts and establish grassroots herder institutions for sustainable pasture management; and (iii) **project management and policy support**. The additional financing initiative will build upon these existing components, incorporating enhancements drawn from past experience, increased human and social capacity and shifts in government policies.

II. Rationale for additional financing

A. Rationale

6. The PMPMD has been very successful in supporting herder groups and their cooperatives and linking them to improve market conditions for small herders. However, the vulnerability of herder groups has recently been projected to increase due to frequent natural hazards from *dzuds*. Details of the *dzud* risk map published by the National Agency for Meteorology, Hydrology, and Environmental Monitoring in 2024 indicate that more than 70 per cent of the country is at high *dzud* risk; 26 per cent of this area is at extreme risk and 43 per cent at high risk, and 26 per cent of the country is at medium risk; only 5 per cent of the country is at low risk. Rural poverty contributes to urban poverty when poor herders who lose their

livestock in *dzuds* move to the Ger district in Ulaanbaatar and seek government assistance.

7. The additional financing will be used to scale up project benefits and help the PMPMD target herders' capacity for resilience to *dzuds* by improving the animal feed and livestock product supply chain. The project will improve herders' access to markets for their livestock products and increase their profitability, thereby ensuring food and financial security in line with Mongolia's Long-term Development Policy: Vision 2050, the Government's National Food Security and Food Supply Programme (Resolution No. 36) and the Sustainable Development Goals. The National Adaptation Plan also aims at sustainable development of the livestock sector.
8. The additional financing will play a critical role in bolstering the attainment of strategic objective 3 of IFAD's country strategy in Mongolia, aimed at empowering vulnerable herder households to withstand and adapt to the adverse impacts of climate change. By addressing the root causes of vulnerability and promoting adaptive practices, this support will not only protect livelihoods in the face of climate uncertainties but pave the way for greater profitability and rural economic stability. The inclusion of the United Nations Industrial Development Organization (UNIDO) for technical assistance will heighten international technology transfer and standard setting for food and non-food supply chains.

Special aspects relating to IFAD's corporate mainstreaming priorities

9. In line with IFAD's mainstreaming commitments, the PMPMD has been validated as:
 - Including climate finance

B. Description of geographical area and target groups

10. The PMPMD's geographical area has evolved over the various phases of project implementation:
 - Initial project: Khentii, Arkhangai, Khuvsgul, Bulgan and Gobi-Altai *aimags* (provinces)
 - Additional financing 1 (AF-1): Khentii, Arkhangai, Uvurkhangai, Dornod, Dundgovi and Sukhbaatar *aimags*
 - AF-2: Nationwide, with the main focus on the Khangai region (Arkhangai, Bayankhongor and Uvurkhangai) and Eastern region (Khentii and Dornod)
11. The selection of *aimags* and *soums* (districts) is based on: (i) the poverty level; (ii) the proportion of rural population, poor households, herder households and livestock; (iii) no geographical overlap with similar activities of other projects/programmes; (iv) other scaling-up potential and demand for value chains; (v) market access; (vi) geographical proximity to form a supply cluster and manage the project; and (vii) the climate change vulnerability of local communities.
12. AF-2 will target 20,000 poor households, with a special focus on herders, women (approximately 40 per cent) and youth (approximately 25 per cent).
13. AF-2 will focus on livestock commodities such as milk, meat, cashmere, wool, skins and hides, which contribute more than 20 per cent to the national GNP and are the basic income of herder households, a large portion of which are living below the poverty line.

C. Components, outcomes and activities

14. PMPMD consisted of three components: (i) market development; (ii) pasture management and climate change adaptation; and (iii) project management and

policy support. Some specific activities evolved due to mechanisms developed by the project and changes in government policy.

15. **Component 1: Market development.** This component is designed to facilitate livelihood development among poor households through small enterprises and microenterprises, and value chain development. The following subcomponents will be included for the additional financing.
16. **Subcomponent 1.1: Building greater resilience to the climate change impacts of *dzuds* through sustainable animal product supply chain systems.** Linkages between community groups (PHGs, cooperatives) and markets were not well coordinated in the early stages of the project. The AF-2 financing will establish internet-linked and solarized innovation agrohubs for robust supply chain and efficient logistics infrastructure for commodity management and to create better market access points for livestock products, offering these groups better options for effectively managing their supply chains. This comprehensive approach will include: (i) digital optimization of inventory management; (ii) the implementation of more efficient transportation and distribution mechanisms; (iii) the introduction of proper storage practices; and (iv) the forging of strategic partnerships with suppliers and buyers. It will also optimize *dzud* preparedness. Investments in and certifications for meat processing plants will increase livestock value chain efficiency, contributing to methane reduction through enhanced productivity and value addition. Upgrading slaughterhouses with biogas systems is critical for reducing greenhouse gas emissions, bringing slaughterhouses up to international standards and aligning with the objectives of Mongolia's Nationally Determined Contribution.¹ This subcomponent will be implemented through technical support from UNIDO under its agro-industrial programmes on food safety and sustainable supply chains.
17. **Subcomponent 1.2: Building more resilience to the impact of *dzuds* through an improved animal feed supply system.** The AF-2 will help herders obtain quality feed and fodder. Timely access to these resources will help herders mitigate the impact of *dzuds* on their livestock and livelihoods.
18. The additional financing will improve the quality and availability of animal feed with new pellet processing to lower transport costs, provide new fodder storage and optimize the composition of feed. Carefully balancing and adjusting feed composition to meet the specific product safety and nutritional requirements of the animals is critical. This not only reinforces adaptation efforts but aligns with mitigation goals by optimizing resource utilization and reducing greenhouse gas emissions associated with inefficient livestock management practices.
19. **Subcomponent 1.3: Building more resilience to the impact of *dzuds* through improved animal health and welfare.** To address adaptation, it is critical to enhance herder resilience in Mongolia to *dzud* impacts, particularly by improving animal health and welfare. The additional financing will promote the health of herder groups' and cooperatives' livestock through collaboration with veterinary professionals. Collaboration with veterinary professionals and interventions like sheep dips and balanced feed formulation mitigate disease vulnerability exacerbated by climate change. These efforts not only aid livestock survival post-*dzud* but contribute to climate change mitigation by reducing methane emissions and boosting overall animal productivity. Animal health will improve marketable milk quantities and improve overall animal quality and productivity, increasing livestock's chances of survival and recovery post-*dzud*. In addition, the project will actively promote mineral supplementation and balanced feed formulation.

¹ <https://unfccc.int/sites/default/files/NDC/2022-06/First%20Submission%20of%20Mongolia%27s%20NDC.pdf>.

20. **Component 2: Pasture management and climate change adaptation.** This component will: (i) increase the capacity and resilience of herders to cope with climate change impacts and strengthen existing grassroots herder institutions developed by PMPMD for sustainable pasture management; (ii) expand skills training for sheep shearing; and (iii) integrate the activities of a potential Adaptation Fund SMART-HERDERS initiative (see subcomponent 2.3).
21. **Subcomponent 2.1: Sustainable rangeland and livestock management for climate resilience.** The project will support improved pasture management and resilience to climate change through capacity-building for herders and local government (pasture, water, animal health and climate change adaptation). This subcomponent will be implemented through existing pasture user groups and cooperatives to upgrade pasture and herd management plans linked to agro hubs and key commodity markets. By linking existing PHGs to markets and promoting rangeland use agreements, it will optimize resource use and foster sustainable agriculture, contributing to both adaptation and mitigation goals in alignment with national climate targets.
22. **Subcomponent 2.2: Livelihood of pastoralists.** Measures such as knowledge-sharing training programmes and the provision of resources will be adopted to empower herders with valuable skills and information, in keeping with the objective of improving herders' livelihoods and access to profitable markets. To ensure improved pastoralist livelihoods (at least 25 per cent of women and youth members), additional entrepreneurial and technical skills training for awareness about finance, market requirements and value addition opportunities will be provided. UNIDO will develop and provide specialized training programmes that include gender-equitable workload distribution aspects and technically supervise delivery of the trainings.
23. **Subcomponent 2.3: Sustainable finance for adaptive solutions and resilient technologies for herders in Mongolia (SMART-HERDERS).** This aims to identify alternative options and a process for mainstreaming them, along with a financing mechanism for climate-smart livestock management and livelihoods in Mongolia. SMART-HERDERS will also initiate the development of a carbon financing mechanism to assist the livestock sector and herders in adopting climate-resilient and low-emission practices and technologies while introducing a knowledge management process for the long-term sustainability of project outcomes.
24. **Component 3: Project management and enabling environment for business development.** This component continues to manage project implementation and develop private sector business promotion capacity at the *aimag* and national levels. This will be achieved through knowledge products on policy development and skills development training for facilitators recruited at the local level. The additional financing will continue to use the existing project management unit (PMU) and its project management mechanism.

D. Costs, benefits and financing

Project costs

25. The total project cost will be US\$45.974 million. This total includes US\$29.771 million of original and first additional financing and US\$16.203 million from the new proposal for additional financing. With this additional financing, the total government contribution will increase to US\$4.307 million and the beneficiary contribution to US\$5.459 million.
26. PMPMD components 1 "Market development" and 2 "Pasture management and climate change adaptation" are partially counted as climate finance. As per the multilateral development banks' methodologies for tracking climate change adaptation and mitigation finance, the total amount of IFAD climate finance for this

additional financing proposal is estimated at US\$6,507,000 (US\$5,679,000 adaptation finance and US\$828,000 mitigation finance).

Table 1

Original and additional financing summary

(Thousands of United States dollars)

	<i>Original financing</i>	<i>Additional financing</i>	<i>%</i>	<i>Total</i>
IFAD initial loan	11 481	-	-	11 481
IFAD additional loan 1	9 061	-	-	9 061
IFAD additional loan 2 - blend	-	3 408	-	3 408
IFAD additional loan 2 - ordinary	-	6 919	-	6 919
Total IFAD	20 542	10 327	67.15	30 869
Global Environment Facility (GEF)	1 500	-	3.26	1 500
UNIDO	-	1 800	3.92	1 800
Adaptation Fund	-	2 039	4.43	2 039
Beneficiaries	4 959	500	11.87	5 459
Borrower/recipient (cash)	1 385	661	-	2 046
Borrower/recipient (in-kind)	1 385	876	-	2 261
Total borrower/recipient	2 770	1 537	9.37	4 307
Total	29 771	16 203	100	45 974

Table 2

Additional financing: project costs by component and financier

(Thousands of United States dollars)

<i>Component</i>	<i>Additional IFAD loan (blend)</i>		<i>Additional IFAD loan (ordinary)</i>		<i>UNIDO</i>		<i>Adaptation Fund</i>		<i>Beneficiaries</i>		<i>Borrower/recipient (cash)</i>		<i>Borrower/recipient (in kind)</i>		<i>Total</i>	
	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>
1. Market development	3 408	31.21	4 043	37.02	1 800	16.48	-	-	500	4.58	661	6.05	510	4.67	10 922	67.40
2. Pasture management and climate change adaptation	-	-	1 550	39.58	-	-	2 039	52.04	-	-	-	-	328	8.38	3 917	24.18
3. Project management	-	-	1 326	97.24	-	-	-	-	-	-	-	-	38	2.76	1 364	8.42
Total	3 408	21.03	6 919	42.71	1 800	11.11	2 039	12.58	500	3.09	661	4.08	876	5.41	16 203	100

Table 3

Additional financing: project costs by expenditure category and financier

(Thousands of United States dollars)

<i>Expenditure category</i>	<i>Additional IFAD loan (blend)</i>		<i>Additional IFAD loan (ordinary)</i>		<i>UNIDO</i>		<i>Adaptation Fund</i>		<i>Beneficiaries</i>		<i>Borrower/recipient</i>				<i>Total</i>	
	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>Amount</i>	<i>%</i>	<i>In-kind</i>	<i>%</i>	<i>Cash</i>	<i>%</i>	<i>In-kind</i>	<i>%</i>	<i>Amount</i>	
Investment costs																
1. Vehicles and equipment	-	-	776	59	-	-	-	-	-	-	511	39	18	1	1305	
2. Goods, services and inputs	3 408	31	2 766	25	1 800	17	2 039	19	-	-	-	-	838	8	10 851	
3. Works, training and workshops	-	-	590	80	-	-	-	-	-	-	151	20	-	-	741	
4. Credit Guarantee Fund	-	-	1 800	78	-	-	-	-	500	22	-	-	-	-	2 300	
Total investment costs	3 408	22	5 933	39	1 800	12	2 039	13	500	3	662	4	856	6	15 197	
Recurrent costs																
5. Operating costs	-	-	986	98	-	-	-	-	-	-	-	-	20	2	1 006	
Total recurrent costs	-	-	986	98	-	-	-	-	-	-	-	-	20	2	1 006	
Total	3 408	21	6 919	43	1 800	11	2 039	13	500	3	662	4	876	5	16 203	

Table 4

Additional Financing: Project costs by component and project year (PY)

(Thousands of United States dollars)

Component	PY1		PY2		PY3		Total
	Amount	%	Amount	%	Amount	%	Amount
1. Market development	4 738	43.38	3 976	36.41	2 208	20.21	10 922
2. Pasture management and climate change adaptation	1 414	36.11	1 238	31.60	1 265	32.29	3 917
3. Project management	573	42.03	375.4	27.52	415.4	30.45	1 364
Total	6 725	41.51	5 590	34.50	3 888	23.99	16 203

Financing and cofinancing strategy and plan

27. The total project financing of US\$45.974 million consists of an IFAD loan accounting for 67.15 per cent, plus 3.92 per cent from UNIDO, 4.43 per cent from the Adaptation Fund, 3.26 per cent from GEF, 9.37 per cent from the Government of Mongolia and 11.87 per cent from the beneficiaries. The additional financing covers a period of three years. The total recurrent cost of the project is US\$2.269 million – i.e. 4.94 per cent of the total finance. The additional recurrent cost is US\$1.0 million – i.e. 6.2 per cent of all additional financing (US\$16.20 million). The additional recurrent cost to be financed by IFAD is US\$0.98 million – i.e. 9.54 per cent.

Disbursement

28. IFAD will transfer funds to the project through the revolving fund mechanism, following the guidance of IFAD's Handbook for Financial Management and Financial Control (FMFC) and the FMFC letter.
29. The main expenditure categories are split between the blend-term loan (33 per cent) and the ordinary-term loan (67 per cent) for easy monitoring of disbursement by financing instrument for this additional financing. These categories include vehicles and equipment; goods, services and inputs; works, training and workshops; Credit Guarantee Fund; and operating costs. The investment ratio to recurrent ratio is 94:06. Upon signing the relevant finance agreement, the PMU will open a designated account in United States dollars to receive the loan proceeds. Funds will be sent by IFAD in United States dollars through the State Bank as per the country's regulations.
30. The report-based mechanism will be used for withdrawing funds from this additional financing through the consolidated quarterly interim financial reports (IFRs). Withdrawal applications will be submitted to IFAD within 30 days of each reporting quarter through the financial execution module of IFAD's Client Portal for providing cash forecasting and requesting disbursement from IFAD. The project will be able to withdraw advances based on the cash forecast for the six-month period, in accordance with the approved annual workplan and budget (AWPB) and aligned with approved quarterly IFRs. The designated account will be administered following the revolving fund modality.

Summary of benefits and economic analysis

31. The main benefit of the additional financing lies in increasing the resilience of target herders to *dzuds* by improving the animal feed and livestock product supply chain while adding workers, including women, as primary beneficiaries.
32. The project collaborates with approximately 240 pasture herder groups, 26 cooperatives and 21 small and medium-sized enterprises. The number of beneficiary households is expected to reach around 20,000 (70 per cent representing the existing beneficiary households and 30 per cent new beneficiary households) by the end of the 2027 project year. A series of benefits will flow from the project assistance: (i) improved performance of existing and new groups, thereby boosting their incomes; and (ii) an increase in profit margins in value

chains, particularly in dairy (yak and camel), meat and non-food value chains, through various management practices and improvements in access to input supplies, markets and financial services.

33. The project's overall economic internal rate of return is estimated at 28 per cent. The benefit-cost ratio is 1.14. The economic net present value of the project net benefit stream, discounted at 13 per cent (Central Bank of Mongolia policy/bond rate) was noted to be US\$3.9 million.
34. Sensitivity analysis confirms that the project remains robust to both decreases in benefits and increases in costs. Nonetheless, it is more sensitive to a decrease in benefits than an increase in costs. A decrease in benefits may be brought about by a decline in output prices or failure to achieve projected yields or outputs.

Exit strategy and sustainability

35. On the policy side, the project has contributed to new legislation to support guarantee loans and has worked closely with the Mongolian National Federation of Pasture User Groups of Herders to consolidate and strengthen pasture herder group pasture planning mechanisms with local *soum* governments, building on the "green gold" methodologies. PMPMD's results also contributed to the Government's National Food Security and Food Supply Programme (Resolution No. 36) under the President's Food Revolution campaign. These are major accomplishments in themselves and also provide for a sustainable project exit strategy.
36. AF-2 will ultimately provide a sustainable private sector-linked exit strategy for PMPMD communities with existing PHGs, cooperatives and informal women's groups by linking cooperative-based agrohubs to buyers, enabling communities to combine livestock products for sale with the bulk purchase of feed. Institutionally, the Mongolian Commodity Exchange and the Malchin Urkhiin Negdsen Kholboo (Munkh) Alliance will continue their linkages after the project to ensure that benefits accrue to community members and their organizations. This will allow the project to phase out direct community support.

III. Risk management

A. Risks and mitigation measures

37. The PMPMD is considered a low-risk project overall, though some moderate risks are identified in the integrated risk framework based on the operating environment and past experience in Mongolia, especially under the PMPMD's previous phases. Country risks are generally low, subject to some uncertainties about the global economic impact and other events on the mining sector, particularly on commodities such as coal, copper and gold. The country's inherent financial management risk is high but mitigated by the use of well-established financial management procedures and capacity; the inherent financial management risk for PMPMD is therefore deemed substantial. The procurement risk is also considered moderate.

Table 5
Overall risk summary

<i>Risk categories</i>	<i>Inherent</i>	<i>Residual</i>
Country context	Low	Low
Sector strategies and policies	Moderate	Low
Environment and climate context	Moderate	Low
Project scope	Moderate	Low
Institutional capacity for implementation and sustainability	Moderate	Low
Procurement	Moderate	Low
Financial management	Substantial	Moderate
Environment, social and climate impact	Moderate	Low
Stakeholders	Moderate	Low
Overall	Moderate	Low

B. Environment and social category

38. The environmental and social category of PMPMD is determined to be moderate, based on the environmental and social screening tool of the 2021 Social, Environmental and Climate Assessment Procedures (SECAP). PMPMD aims to comprehensively generate positive environmental and social benefits. The project identified moderate pollution-related risk associated with waste, water, animal handling and related activities under components 1 and 2. There are potential risks of a minor impact on cultural heritage, which will be confirmed once the project sites are known. In relation to labour and working conditions, some of the activities entail associated occupational health and safety risks that will be mitigated through training, the use of personal protective equipment and other actions. For community health and safety, the project will identify specific mitigation actions, as appropriate.
39. The project will also work through financial institutions for the credit guarantee lending, and environmental and social due diligence in regard to the environmental and social management system will be conducted.

C. Climate risk classification

40. As per the SECAP screening tool, the project's climate risk category is determined to be moderate. The climate risk assessment involves identifying: (i) various hazards using tools like the Think Hazard tool; (ii) exposure, sensitivity, adaptation capacity and climate resilience through assessment and on-site visits that highlight climate risks; and (iii) the occurrence of *dzuds*, urban floods, landslides, water scarcity and extreme temperatures. The project employs an integrated approach, addressing rangeland management, livestock value chain efficiency and methane emission reduction, aligning with Mongolia's Nationally Determined Contribution and National Adaptation Plan. This strategy aims to increase resilience, promote sustainable farming practices, improve food security and mitigate climate risks in vulnerable sectors.

D. Debt sustainability

41. By the end of the 2023 financial year, Mongolia's external debt had risen to US\$34.0 billion. The Government's external debt accounted for US\$7.8 billion (23 per cent in total external debt). This represents a decrease in both the amount and the share of the Government's external debt compared to 2022, when it was US\$8.0 billion (23.8 per cent). In 2023, the external debt-to-GDP ratio stood at 171 per cent, showing a decline from 196 per cent in 2022. The Government adheres to the Fiscal Stability Law and the Debt Management Law, which stipulate that the Government debt-to-GDP ratio should not exceed 60 per cent. The current ratio of 40 per cent aligns with this legal requirement. External debt plays a critical role for the Government, as it relies on foreign borrowing for outstanding external loan repayments.

IV. Implementation

A. Compliance with IFAD policies

42. The proposed additional financing is fully aligned with IFAD's Strategic Framework 2016–2025, particularly the strategic objectives of increasing poor rural people's productive capacities and their benefits from market participation. Furthermore, PMPMD specifically promotes an enabling policy and regulatory framework for higher levels of investment in the rural sector. An expanded and scaled-up PMPMD adheres to IFAD policies and strategies on gender mainstreaming; environment and natural resource management; climate change; social, environmental and climate assessment; and scaling up.

B. Organizational framework

Management and coordination

43. PMPMD will continue to be managed by a project steering committee (PSC) that includes the Office of the Secretary of the Parliament, the Ministry of Finance, the Ministry of Food, Agriculture and Light Industry (MoFALI), the Ministry of Foreign Affairs (Trade Department), IFAD, UNIDO and MCE. The PSC will be chaired by MoFALI. The project coordinator, the head of the PMU, will act as the Secretary of the PSC.
44. The project director will be the Director General, Department of Strategy and Planning of MoFALI, and will be responsible for the consolidation of: (i) the AWPB; (ii) financial and activity reports; and (iii) the budgets of PMPMD, Adaption Fund, PMU and the loan guarantee fund before their submission to the PSC.

Financial management, procurement and governance

45. The current PMU will manage IFAD's additional financing. The UNIDO grant will be handled by the UNIDO office pursuant to UNIDO's established roles and procedures. If the Adaptation Fund grant is approved, the project will open a separate fund account to be administered by IFAD. Both cofinancing amounts will be subject to the same financial management procedures and policies (including financial reporting and auditing) as for the IFAD financing requirements.
46. **Flow of funds.** The PMU shall open a new designated account in United States dollars for this additional loan before disbursement begins. The first advance will be equivalent to approximately six months of project expenditure pursuant to the approved AWPB. Further fund disbursements will be based on the quarterly IFRs submitted to IFAD within 30 days of each reporting quarter. A separate dedicated bank account will be maintained for managing the Government counterpart funding.
47. **Internal control.** In the project implementation manual, the existing financial management manual should be updated to include all new elements related to this additional financing that may include changes to financial management arrangements. The PMU should conduct periodic field visits to implementing partners and control checks to ensure the proper use of funds.
48. **Accounting and financial reporting.** The project will be using the Cash Basis IPSAS² of accounting. The current accounting software is QuickBooks. Since this is the second additional financing, PMU should consider upgrading the accounting software to ensure automated generation of financial reports that includes all financing for the project.
49. **External audit.** The annual project audit is performed in accordance with the International Standards on Auditing, and the satisfactory audit report and project-certified financial statements, including the management letter, are submitted to IFAD no later than six months after the covered financial year. The

² International Public Sector Accounting Standards.

audit terms of reference will be updated to include this additional financing by the PMU as per IFAD guidelines.

50. **Procurement.** The procurement of goods, works and services under the additional financing for PMPMD, financed with resources provided or administered by IFAD, will be carried out in accordance with the provisions of Mongolia's procurement law/regulations, insofar as they are consistent with the provisions of IFAD's Project Procurement Guidelines and Handbook (dated September 2010) and as amended from time to time. Procurement processes and procedures will follow as stated in the project implementation manual. The PMU will prepare annual procurement plans and update/upgrade them as required to reflect actual implementation needs. Procurement will be carried out in accordance with the consolidated procurement plan submitted by the PMU and approved by the PSC with the no objection provided by IFAD.
51. **Governance.** All project stakeholders shall be consistently made aware that IFAD applies a zero-tolerance policy towards fraudulent, corrupt, collusive or coercive practices in projects financed by its loans and grants. The dissemination of IFAD's anticorruption policy among project staff and stakeholders will be ensured, including the incorporation of appropriate provisions in bidding documents and contracts.

C. Monitoring and evaluation, learning, knowledge management and strategic communication

52. The project will implement the following:
- Regular monitoring of logical framework indicators by the PMU and technical assistance from UNIDO in their respective areas of responsibility, with reporting to the PSC.
 - A baseline and endline survey, organized by the PMU, that will assess logframe-based objectives and progress.
 - The PMU and UNIDO will maintain social media sites with a large audience of women and youth to regularly share results highlighting the role of women and youth.
 - The PMU and UNIDO will conduct media outreach on television whenever possible, with special emphasis on women and youth role models.
 - All trainings with at least 25 per cent women and youth participants will be conducted both in person and online with prior announcements so that anyone can follow them on YouTube or Facebook.

D. Proposed amendments to the financing agreement

53. The proposed amendments to the financing agreement are: (i) revision of the financing agreement to include the amount of the loan, the financing terms, the amortization schedule and the duration of the loan; (ii) the revision of schedule 1 to integrate the enhanced scale of development objectives in terms of outreach; (iii) the revision of schedule 2 to integrate the proposed additional IFAD financing; and (iv) the additional schedule 3 – special covenants (SECAP). The new project completion and financing closing dates will be 31 March 2027 and 30 September 2027, respectively.

V. Legal instruments and authority

54. A financing agreement between Mongolia and IFAD will constitute the legal instrument for extending the proposed financing to the borrower/recipient. The signed financing agreement will be amended following approval of the additional financing.
55. Mongolia is empowered under its laws to receive financing from IFAD.

56. I am satisfied that the proposed additional financing will comply with the Agreement Establishing IFAD and the Policies and Criteria for IFAD Financing.

VI. Recommendation

57. I recommend that the Executive Board approve additional financing in terms of the following resolution:

RESOLVED: that the Fund shall provide a loan on blend terms to Mongolia in an amount of three million, four hundred and seven thousand, nine hundred and ninety-seven United States dollars (US\$3,407,997) and upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented herein.

RESOLVED FURTHER: that the Fund shall provide a loan on ordinary terms to Mongolia in an amount of six million, nine hundred and nineteen thousand, two hundred and sixty-six United States dollars (US\$6,919,266) and upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented herein.

Alvaro Lario
President

Updated logical framework incorporating the additional financing

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target	
Outreach	1. Persons receiving services promoted or supported by the project						Major shocks or crises which could weaken project effects do not occur or are sufficiently mitigated				
	Males - Males		63 600	RIMS report	Annual	PMU		12 000 ³	8 400	3 600	67 200
	Females - Females		73 000					8 000	5 600	2 400	75 400
	Total number of persons receiving services - Number of people		136 600					20 000	14 000	6 000	142 600
	1.a Corresponding number of households reached										
	Women-headed households - Households	324	470	RIMS report	Annual	PMU		3 000	2 100	900	1 370
	Non-women-headed households - Households	35 211	57 530					17 000	11 900	5 100	62 630
	Households - Households	19 700	58 000					20 000	14 000	6 000	64 000
1.b Estimated corresponding total number of households members											
Household members - Number of people	88 650	136 600	RIMS report	Annual	PMU	80 000	56 000	21 600	230 400 ⁴		
Project Goal Empower poor rural women and men to achieve higher income and sustainable improvement in their livelihoods	Poverty ratio (% of population) at rural poverty line						Political stability. Major shocks or crises which could weaken project effects do not occur or are sufficiently mitigated.				
% of population at rural poverty line - Percentage (%)		25%	National poverty statistics	Every two years	PMU					25%	
Development Objective To reduce poverty and improve livelihoods of poor herder and soum- and aimag-centre	Improvement (%) in HH income						Incentives to implement the pasture management plans agreed by the PHGs are understood by				
Improvement in household income - Percentage (%)	10%	15%	Base line survey, Project MIS Measurement	Annual	PMU					15%	

³ AF is targeting 70% of old beneficiaries and 30% of new beneficiaries. 12, 000 is coming from the sum of existing 8,400 beneficiary + 3,600 new beneficiary

⁴ The AF is correcting the previous end target for indicator 1.b Household members - Number of people, as the ratio of the previous end target was 2.3 members by household. The AF is now reporting for 21 600 HHs members for 6 000 HHs for a ratio of 3.6 members per household, consistent with the results for all the years (from 2012 to 2023) in the previous project cycle.

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target	
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target		
households in the project area							PHG members and maintained.					
	Improvement in HH assets ownership index											
	HH assets ownership index - Percentage (%)	30%	35%	Baseline survey, CI survey	Annual	PMU					35%	
Outcome Outcome 1 Improved Pasture Management and resilience to Climate Change	3.2.2 Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices						Incentives to implement the pasture management plans agreed by the PHGs are understood by PHG members and maintained.					
	Total number of household members - Number of people	2 771	10 000	RIMS report	Annual	PMU					10 000	
	% increase of animal survivorship during Dzud compare to treatment group							15%		15%	15%	
	3.2.1: Number of tons of greenhouse gas emissions (CO2e) avoided and/or sequestered over 20 years - Tone							40M		40M	40M	
Output Output 1.1 Pasture Herder Groups (PHGs) formed and capacitated for improved pasture management	People trained in community management topics						Herders are willing to invest time in learning CC impacts and adaptation options for better pasture management.					
	Men trained in other - Males	692	1 500	RIMS report	Annual	PMU					1 500	
	Women trained in other - Females	2 401	3 600								3 600	
	Persons trained in other - Number of people	3 093	5 100								5 100	
	3.1.1 Groups supported to sustainably manage natural resources and climate-related risks											
	Total size of groups - Number of people	9 450	12 700	Annual CI survey	Annual	PMU					12 700	
	Groups supported - Groups	120	264								264	
	Males - Males	4 725	5 800								5 800	
Females - Females	4 725	6 900							6 900			
Output Output 1.2: Soum-level investment for	Village/community plans (a.k.a. pasture management plan) formulated						PHGs participate in Bagh-and					
	Plans formulated - Number	120	264	RIMS report	Annual	PMU		50		50	314	

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target	
climate change adaptation prepared in a participatory way							Soum-level meetings.				
Output Output 1.3 Resilience of pasture land improved and monitored	Increase of rangeland monitoring sites where improvement of pasture conditions reported						No major drought hit in the project areas; and PHGs agree on the common resource use plan.				
	Increase - Number		50	National rangeland monitoring database (NAMEM)	Annual	PMU					50
	3.1.4 Land brought under climate-resilient practices										
	Hectares of land - Area (ha)	306 595	370 000	RIMS report	Annual	PMU		100 000		100 000	470 000
Output Output 1.4 Soum Strategies for Pasture Management and Climate Change Adaptation developed	Number of strategies developed						ALAGAC procedures are followed				
	Number of strategies developed - Number	7	25	Annual CI survey	Annual	PMU		20		20	45
Output Output 1.5 Soum-level investment for Climate Change Adaptation	Soum level investment to improve preparedness to climate risk or winter (incl. hay making, hay storage, winter shelter, better access to water)						PHGs agree on the set of M&E indicators and participate in voluntary M&E.				
	Livestock mortality decrease - Percentage (%)		1%								1%
Output Output 1.6 Feed supplement and veterinary services	# of herder receive promotion inputs of feed supplement and veterinary services						Herders are willing to participate in group activities. Herders are willing to invest time in learning CC impacts and adaptation options for better pasture management.	5000		5000	5000
Output Output 1.7 Promotion of quality animal	# of awards for hiest animal weight							100		100	100
Output Output 1.8 tracking methane emission from Animal	# of pilloting tracking methane emission from Animal in the target area through tier 2 method							1		1	1

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target		
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target			
Outcome Outcome 2 Value addition in production and processing, and market access improved	# of AgroHub function						Successful identification of international and domestic buyers	40		40	40		
	# of animal Feed hub function with online service							1		1	1		
Output Output 2.1 Productivity of producers increased	1.1.4 Persons trained in production practices and/or technologies			RIMS report	Annual	PMU	Steady value chain development						
	Men trained in crop - Males	280	280								280		
	Women trained in crop - Females	419	419								419		
	Men trained in livestock - Males	825	3 000								3 000		
	Women trained in livestock - Females	555	2 000								2 000		
	Total persons trained in crop - Number of people	699	699								699		
	Total persons trained in livestock - Number of people	1 380	5 000								5 000		
Output Output 2.2 Value addition of commodities increased	2.1.2 Persons trained in income-generating activities or business management			RIMS report	Annual	PMU	Steady business growth						
	Males - Males	289	500										500
	Females - Females	834	1 800										1 800
	Persons trained in IGAs or BM (total) - Number of people	1 123	2 300										2 300
Output Output 2.3 Rural financing established and accessed by rural producers and enterprises	1.1.5 Persons in rural areas accessing financial services			RIMS report	Annual	PMU	Businesses are matured within the project years.						
	Women in rural areas accessing financial services - savings - Females	288	500										500
	Men in rural areas accessing financial services - savings - Males	72	230										230
	Total persons accessing financial services - savings - Number of people	360	730										730

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target	
2.1.6 Market, processing or storage facilities constructed or rehabilitated											
	Total number of facilities - Facilities	21	45								45
	Processing facilities constructed/rehabilitated - Facilities	21	45								45
	# of cooperative access to credit line							40		40	40
Output Output 2.4 AgroHub set up	# of AgroHub set up							40		40	40
Output Output 2.5. Application of ICT	# of application set up to run the AgroHub and to improve connectivity with MCE							2		2	2
Output Output 2.6. Certification and traceability	# of certification and traceability							5		5	5
Output Output 2.7. Promotion processing facility	# of herder receive promotion inputs of equipment, packaging, and marketing.							5000		5000	5000
Output Output 2.8. Online service established	# online service established							1		1	1
Output Output 2.9 Pellet mill SME	# of pellet mill SME established							7		7	7
Output Output 2.10. Retail fodder storage supply scheme	# of retail fodder storage supply scheme established							7		7	7
Output Output 2.11. Linkage with school lunch programme	# of soum benefiting from school lunch programme							10		10	10
Outcome	2.2.2 Supported rural enterprises reporting an increase in profit										

Results Hierarchy	Indicators			Means of Verification			Assumptions	Additional Financing Target 2024 - 27			Final project target			
	Name	Mid-Term	End Target	Source	Freq.	Resp.		Total	Existing Target	New Target				
Outcome 3 Enabling business environment for niche market	Number of enterprises - Enterprises	45	100				SMEs are connected to buyers through associations.				100			
Output	2.1.4 Supported rural producers that are members of a rural producers' organization													
Output 3.1 Local Agri-business development plans prepared and services provided through association and local facilitators	Total number of persons - Number of people	45	72	Project MIS measures	Annual	PMU	SMEs are connected to buyers through associations.				72			
	Males - Males	20	30											30
	Females - Females	25	42											42
Output	Number of stakeholders involved in the platforms to promote innovative product in market													
Output 3.2 Platforms established and in operation to penetrate niche market	Stakeholders - Number	20	50				SMEs are connected to buyers through associations				50			
Output	Households contracted with MSEs cooperatives and suppliers													
Output 3.3 Strengthened backward linkages of existing MSEs/cooperatives to poor HH	Households - Number	130	500								500			
Output	# of financing mechanism for climate smart livestock management established													
Output 3.4 financing mechanism for climate resilient (only applicable if Adaptation Fund proposal approved)								1		1	1			

Updated summary of the economic and financial analysis

Table A: Financial and economic cash flow models

Appendix II-1: PHG household subproject model

										(MNT'000)
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Pasture productivity	25,542,000	28,096,200	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400
Mortality reduction	-	-	-	-	-	-	-	-	-	-
Sub-total	25,542,000	28,096,200	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400	30,650,400
With project										
Main production										
Pasture productivity	25,542,000	28,096,200	33,715,440	33,715,440	33,715,440	33,715,440	33,715,440	33,715,440	33,715,440	33,715,440
Mortality reduction	-	-	10,598,640	10,598,640	10,598,640	10,598,640	10,598,640	10,598,640	10,598,640	10,598,640
Sub-total	25,542,000	28,096,200	44,314,080	44,314,080	44,314,080	44,314,080	44,314,080	44,314,080	44,314,080	44,314,080
Increments	-	-	13,663,680	13,663,680	13,663,680	13,663,680	13,663,680	13,663,680	13,663,680	13,663,680
IRR =		None		NPV =		51,350,037				

Appendix II-2: Camel farm subproject model

										(MNT'000)
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Sales income	-	-	-	-	-	-	-	-	-	-
Proxy workdays	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Sub-total income	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Production cost										
Sub-total cost	-	-	-	-	-	-	-	-	-	-
Sub-total benefit	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
With project										
Main production										
Sales income	-	-	640,000	960,000	960,000	960,000	960,000	960,000	960,000	960,000
Proxy workdays	30,000	12,000	-	-	-	-	-	-	-	-
Sub-total income	30,000	12,000	640,000	960,000	960,000	960,000	960,000	960,000	960,000	960,000
Production cost										
Salary	30,000	60,000	300,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
Forage and hay	-	37,500	150,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Fuel	4,500	12,000	30,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Miscellaneous	5,000	10,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Sub-total cost	39,500	119,500	500,000	680,000	680,000	680,000	680,000	680,000	680,000	680,000
Sub-total benefit	(9,500)	(107,500)	140,000	280,000	280,000	280,000	280,000	280,000	280,000	280,000

Total incremental benefits	(39,500)	(125,500)	104,000	244,000	244,000	244,000	244,000	244,000	244,000	244,000
	IRR =	88%		NPV =	686,719					

Appendix II-3

Red goat dairy subproject model

a. Financial budget estimation (MNT'000)

Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Sales income	7,049,040	8,458,848	11,118,686	11,118,686	11,118,686	11,118,686	11,118,686	11,118,686	11,118,686	11,118,686
Proxy workdays	1,800,000	2,160,000	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200
Sub-total income	8,849,040	10,618,848	13,957,886	13,957,886	13,957,886	13,957,886	13,957,886	13,957,886	13,957,886	13,957,886
Production cost										
Salary	6,750,000	8,100,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000
Fodder and hay	1,057,356	1,268,827	1,667,803	1,667,803	1,667,803	1,667,803	1,667,803	1,667,803	1,667,803	1,667,803
Fuel	900,000	1,080,000	1,419,600	1,419,600	1,419,600	1,419,600	1,419,600	1,419,600	1,419,600	1,419,600
Miscellaneous	750,000	900,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000
Sub-total cost	9,457,356	11,348,827	14,917,403	14,917,403	14,917,403	14,917,403	14,917,403	14,917,403	14,917,403	14,917,403
Sub-total benefit	(608,316)	(729,979)	(959,517)	(959,517)	(959,517)	(959,517)	(959,517)	(959,517)	(959,517)	(959,517)
With project										
Main production										
Sales income	7,049,040	13,176,000	22,226,204	25,978,680	29,226,015	29,226,015	29,226,015	29,226,015	29,226,015	29,226,015
Proxy workdays	-	-	-	-	-	-	-	-	-	-
Sub-total income	7,049,040	13,176,000	22,226,204	25,978,680	29,226,015	29,226,015	29,226,015	29,226,015	29,226,015	29,226,015
Production cost										
Salary	6,750,000	8,343,000	11,295,402	11,634,264	14,196,000	14,196,000	14,196,000	14,196,000	14,196,000	14,196,000
Fodder and hay	2,305,800	4,532,544	6,096,330	8,183,284	8,183,284	8,183,284	8,183,284	8,183,284	8,183,284	8,183,284
Fuel	1,200,000	1,440,000	1,892,800	1,892,800	1,892,800	1,892,800	1,892,800	1,892,800	1,892,800	1,892,800
Miscellaneous	750,000	900,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000	1,183,000
Sub-total cost	11,005,800	15,215,544	20,467,533	22,893,349	25,455,084	25,455,084	25,455,084	25,455,084	25,455,084	25,455,084
Sub-total benefit	(3,956,760)	(2,039,544)	1,758,671	3,085,331	3,770,931	3,770,931	3,770,931	3,770,931	3,770,931	3,770,931
Total incremental benefits	(3,348,444)	(1,309,565)	2,718,189	4,044,849	4,730,448	4,730,448	4,730,448	4,730,448	4,730,448	4,730,448
	IRR =	57%		NPV =	11,973,797					

Appendix II-4
Yak dairy subproject model

<i>a. Financial budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	22,589,490	39,531,607	53,028,827	53,028,827	53,028,827	53,028,827	53,028,827	53,028,827	53,028,827	53,028,827	
Proxy workdays	3,600,000	6,300,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	
Sub-total income	26,189,490	45,831,607	61,479,827	61,479,827	61,479,827	61,479,827	61,479,827	61,479,827	61,479,827	61,479,827	
Production cost											
Salary	12,000,000	21,000,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	
Fodder and hay	3,049,581	5,336,767	7,158,892	7,158,892	7,158,892	7,158,892	7,158,892	7,158,892	7,158,892	7,158,892	
Fuel	3,000,000	5,250,000	7,042,500	7,042,500	7,042,500	7,042,500	7,042,500	7,042,500	7,042,500	7,042,500	
Miscellaneous	1,000,000	1,750,000	2,347,500	2,347,500	2,347,500	2,347,500	2,347,500	2,347,500	2,347,500	2,347,500	
Sub-total cost	19,049,581	33,336,767	44,718,892	44,718,892	44,718,892	44,718,892	44,718,892	44,718,892	44,718,892	44,718,892	
Sub-total benefit	7,139,909	12,494,840	16,760,935	16,760,935	16,760,935	16,760,935	16,760,935	16,760,935	16,760,935	16,760,935	
With project											
Main production											
Sales income	22,589,490	41,508,187	66,816,322	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	
Proxy workdays	3,600,000	3,780,000	-	-	-	-	-	-	-	-	
Sub-total income	26,189,490	45,288,187	66,816,322	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	77,952,376	
Production cost											
Salary	12,000,000	21,000,000	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	
Fodder and hay	3,049,581	5,336,767	8,749,756	8,749,756	8,749,756	8,749,756	8,749,756	8,749,756	8,749,756	8,749,756	
Fuel	4,000,000	7,000,000	9,390,000	9,390,000	9,390,000	9,390,000	9,390,000	9,390,000	9,390,000	9,390,000	
Miscellaneous	2,000,000	3,500,000	4,695,000	4,695,000	4,695,000	4,695,000	4,695,000	4,695,000	4,695,000	4,695,000	
Sub-total cost	21,049,581	36,836,767	51,849,856	51,849,856	51,849,856	51,849,856	51,849,856	51,849,856	51,849,856	51,849,856	
Sub-total benefit	5,139,909	8,451,420	14,966,466	26,102,519	26,102,519	26,102,519	26,102,519	26,102,519	26,102,519	26,102,519	
Total incremental benefits	(2,000,000)	(4,043,420)	(1,794,470)	9,341,584	9,341,584	9,341,584	9,341,584	9,341,584	9,341,584	9,341,584	
IRR =		65%		NPV =	22,452,644						

Appendix II-5

Camel milk AgroHub subproject model

<i>a. Financial budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
<i>Without project</i>											
Main production											
Sales income	-	-	-	-	-	-	-	-	-	-	
Proxy workdays	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
Sub-total income	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
Production cost											
Sub-total cost	-	-	-	-	-	-	-	-	-	-	
Sub-total benefit	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
<i>With project</i>											
Main production											
Sales income	-	-	10,080,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	
Proxy workdays	18,000	4,800	-	-	-	-	-	-	-	-	
Sub-total income	18,000	4,800	10,080,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	15,120,000	
Production cost											
Salary	375,000	500,000	750,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	
Milk purchase	-	-	8,400,000	12,600,000	12,600,000	12,600,000	12,600,000	12,600,000	12,600,000	12,600,000	
Fuel	180,000	240,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	
Electricity	15,000	20,000	30,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	
Miscellaneous	30,000	40,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	
Sub-total cost	600,000	800,000	9,600,000	13,965,000	13,965,000	13,965,000	13,965,000	13,965,000	13,965,000	13,965,000	
Sub-total benefit	(582,000)	(795,200)	480,000	1,155,000	1,155,000	1,155,000	1,155,000	1,155,000	1,155,000	1,155,000	
Total incremental benefits	(600,000)	(800,000)	472,800	1,147,800	1,147,800	1,147,800	1,147,800	1,147,800	1,147,800	1,147,800	
	IRR =	51%		NPV =	2,688,295						

Appendix II-6

Non-food AgroHub subproject model

<i>a. Financial budget estimation</i>										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
<i>Without project</i>										
Main production										
Wool sells	765,876	1,148,815	1,531,753	1,531,753	1,531,753	1,531,753	1,531,753	1,531,753	1,531,753	1,531,753
Hide sells	332,731	499,096	665,462	665,462	665,462	665,462	665,462	665,462	665,462	665,462
Sheep skin sells	129,816	194,724	259,632	259,632	259,632	259,632	259,632	259,632	259,632	259,632
Goat skin sells	1,151,144	1,726,716	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288
Sub-total income	2,379,567	3,569,351	4,759,135	4,759,135	4,759,135	4,759,135	4,759,135	4,759,135	4,759,135	4,759,135
Production cost										
Wool purchase	382,938	574,407	765,876	765,876	765,876	765,876	765,876	765,876	765,876	765,876
Hide purchase	249,548	374,322	499,096	499,096	499,096	499,096	499,096	499,096	499,096	499,096
Sheep skin sells	64,908	97,362	129,816	129,816	129,816	129,816	129,816	129,816	129,816	129,816
Goat skin purchase	863,358	1,295,037	1,726,716	1,726,716	1,726,716	1,726,716	1,726,716	1,726,716	1,726,716	1,726,716
Salary	200,000	300,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Fuel	300,000	450,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000
Miscellaneous	100,000	150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Sub-total cost	2,160,752	3,241,129	4,321,505	4,321,505	4,321,505	4,321,505	4,321,505	4,321,505	4,321,505	4,321,505
Sub-total benefit	218,815	328,222	437,630	437,630	437,630	437,630	437,630	437,630	437,630	437,630
<i>With project</i>										
Main production										
Wool sells	765,876	1,148,815	2,297,629	2,297,629	2,297,629	2,297,629	2,297,629	2,297,629	2,297,629	2,297,629
Hide sells	332,731	499,096	831,827	831,827	831,827	831,827	831,827	831,827	831,827	831,827
Sheep skin sells	129,816	194,724	389,448	389,448	389,448	389,448	389,448	389,448	389,448	389,448
Goat skin sells	1,151,144	1,726,716	2,877,860	2,877,860	2,877,860	2,877,860	2,877,860	2,877,860	2,877,860	2,877,860
Sub-total income	2,379,567	3,569,351	6,396,765	6,396,765	6,396,765	6,396,765	6,396,765	6,396,765	6,396,765	6,396,765
Production cost										
Wool purchase	382,938	574,407	1,102,862	1,102,862	1,102,862	1,102,862	1,102,862	1,102,862	1,102,862	1,102,862
Hide purchase	249,548	374,322	598,916	598,916	598,916	598,916	598,916	598,916	598,916	598,916
Sheep skin sells	64,908	97,362	259,632	259,632	259,632	259,632	259,632	259,632	259,632	259,632
Goat skin purchase	863,358	1,295,037	2,072,059	2,072,059	2,072,059	2,072,059	2,072,059	2,072,059	2,072,059	2,072,059
Salary	320,000	480,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000
Fuel	300,000	450,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000
Miscellaneous	100,000	150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Sub-total cost	2,280,752	3,421,129	5,633,469	5,633,469	5,633,469	5,633,469	5,633,469	5,633,469	5,633,469	5,633,469
Sub-total benefit	98,815	148,222	763,296	763,296	763,296	763,296	763,296	763,296	763,296	763,296
Total incremental benefits	(120,000)	(180,000)	325,666	325,666	325,666	325,666	325,666	325,666	325,666	325,666
IRR =		81%								
NPV =					976,737					

Appendix II-7

Camel milk powder processing subproject model

<i>a. Financial budget estimation</i>										<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Sales income	-	-	-	-	-	-	-	-	-	-
Proxy workdays	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Sub-total income	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Production cost										
Sub-total cost	-	-	-	-	-	-	-	-	-	-
Sub-total benefit	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
With project										
Main production										
Sales income	-	-	3,281,250	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000
Proxy workdays	6,000	3,600	-	-	-	-	-	-	-	-
Sub-total income	6,000	3,600	3,281,250	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000	5,250,000
Production cost										
Salary	375,000	375,000	375,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000
Milk purchase	-	-	2,250,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000
Fuel	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000
Electricity	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Miscellaneous	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Sub-total cost	575,000	575,000	2,825,000	4,250,000	4,250,000	4,250,000	4,250,000	4,250,000	4,250,000	4,250,000
Sub-total benefit	(569,000)	(571,400)	456,250	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Total incremental benefits	(575,000)	(572,600)	455,050	998,800	998,800	998,800	998,800	998,800	998,800	998,800
	IRR = 53%		NPV = 2,419,506							

Appendix II-8

Meat processing subproject model

a. Financial budget estimation										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Without project										
Main production										
Sales income	20,275,450	20,275,450	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992
	-	-	-	-	-	-	-	-	-	-
Sub-total income	20,275,450	20,275,450	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992	30,412,992
Production cost										
Salary	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000
Animal sourcing	14,976,000	14,976,000	22,464,000	22,464,000	22,464,000	22,464,000	22,464,000	22,464,000	22,464,000	22,464,000
Fuel	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000
Electricity	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Miscellaneous	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Sub-total cost	18,336,000	18,336,000	25,824,000	25,824,000	25,824,000	25,824,000	25,824,000	25,824,000	25,824,000	25,824,000
Sub-total benefit	1,939,450	1,939,450	4,588,992	4,588,992	4,588,992	4,588,992	4,588,992	4,588,992	4,588,992	4,588,992
With project										
Main production										
Sales income	20,275,450	20,275,450	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888
	-	-	-	-	-	-	-	-	-	-
Sub-total income	20,275,450	20,275,450	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888	35,481,888
Production cost										
Salary	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000
Animal sourcing	14,976,000	14,976,000	26,208,000	26,208,000	26,208,000	26,208,000	26,208,000	26,208,000	26,208,000	26,208,000
Fuel	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000	720,000
Electricity	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Miscellaneous	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Sub-total cost	18,768,000	18,768,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000	30,000,000
Sub-total benefit	1,507,450	1,507,450	5,481,888	5,481,888	5,481,888	5,481,888	5,481,888	5,481,888	5,481,888	5,481,888
Total incremental benefits	(432,000)	(432,000)	892,896	892,896	892,896	892,896	892,896	892,896	892,896	892,896
	IRR = 74%		NPV = 2,635,009							

Appendix II-9

Wool processing subproject model

<i>a. Financial budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
<i>Without project</i>											
Main production											
Sales income	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	
Sub-total income	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	5,400,000	
Production cost											
Salary	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	
Wool sourcing	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	
Fuel	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	
Electricity	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	
Miscellaneous	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	
Sub-total cost	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	5,142,500	
Sub-total benefit	257,500	257,500	257,500	257,500	257,500	257,500	257,500	257,500	257,500	257,500	
<i>With project</i>											
Main production											
Sales income	5,400,000	5,400,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	
Sub-total income	5,400,000	5,400,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	
Production cost											
Salary	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	
Wool sourcing	2,250,000	2,250,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	
Fuel	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	
Electricity	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	62,500	
Miscellaneous	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	
Sub-total cost	6,342,500	6,342,500	7,467,500	7,467,500	7,467,500	7,467,500	7,467,500	7,467,500	7,467,500	7,467,500	
Sub-total benefit	(942,500)	(942,500)	1,532,500	1,532,500	1,532,500	1,532,500	1,532,500	1,532,500	1,532,500	1,532,500	
Total incremental benefits	(1,200,000)	(1,200,000)	1,275,000	1,275,000	1,275,000	1,275,000	1,275,000	1,275,000	1,275,000	1,275,000	
	IRR =	41%		NPV =	2,789,907						

Appendix II-10
Feed processing subproject model

a. Financial budget estimation <i>(MNT'000)</i>										
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Sales income	-	-	-	-	-	-	-	-	-	-
Proxy workdays	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Sub-total income	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Production cost										
	-	-	-	-	-	-	-	-	-	-
Sub-total cost	-	-	-	-	-	-	-	-	-	-
Sub-total benefit	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
With project										
Main production										
Sales income	3,125,000	3,750,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000
	-	-	-	-	-	-	-	-	-	-
Sub-total income	3,125,000	3,750,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000	7,500,000
Production cost										
Salary	600,000	720,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000
Forage and ingredients	2,312,500	2,775,000	5,550,000	5,550,000	5,550,000	5,550,000	5,550,000	5,550,000	5,550,000	5,550,000
Fuel	180,000	216,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Electricity	62,500	75,000	93,750	93,750	93,750	93,750	93,750	93,750	93,750	93,750
Miscellaneous	100,000	120,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Sub-total cost	3,255,000	3,906,000	6,963,750	6,963,750	6,963,750	6,963,750	6,963,750	6,963,750	6,963,750	6,963,750
Sub-total benefit	(130,000)	(156,000)	536,250	536,250	536,250	536,250	536,250	536,250	536,250	536,250
Total incremental benefits	(190,000)	(170,400)	518,250	518,250	518,250	518,250	518,250	518,250	518,250	518,250
	IRR =	95%		NPV =	1,646,067					

Appendix II-11

Summary of financial analysis for subprojects

<i>Year</i>	<i>PHG household</i>	<i>Camel farm</i>	<i>Red goat dairy household</i>	<i>Yak dairy household</i>	<i>Camel milk AgroHub</i>	<i>Non-food AgroHub</i>	<i>Camel milk SME</i>	<i>Meat processing SME</i>	<i>Wool processing SME</i>	<i>Feed processing SME</i>	<i>Total</i>
Y1 - 2024	-	(39,500)	(3,348,444)	(2,000,000)	(600,000)	(120,000)	(575,000)	(432,000)	(1,200,000)	(190,000)	(8,504,944)
Y2 - 2025	-	(125,500)	(1,309,565)	(4,043,420)	(800,000)	(180,000)	(572,600)	(432,000)	(1,200,000)	(170,400)	(8,833,484)
Y3 - 2026	13,663,680	104,000	2,718,189	(1,794,470)	472,800	325,666	455,050	892,896	1,275,000	518,250	18,631,061
Y4 - 2027	13,663,680	244,000	4,044,849	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	32,452,524
Y5 - 2028	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
Y6 - 2029	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
Y7 - 2030	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
Y8 - 2031	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
Y9 - 2032	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
Y10 - 2033	13,663,680	244,000	4,730,448	9,341,584	1,147,800	325,666	998,800	892,896	1,275,000	518,250	33,138,124
NPV (MNT'000)	51,350,037	686,719	11,973,797	22,452,644	2,688,295	976,737	2,419,506	2,635,009	2,789,907	1,646,067	99,618,716
NPV (USD'000)	15,172	203	3,538	6,634	794	289	715	779	824	486	29,434
FIRR	None	88%	57%	65%	51%	81%	53%	74%	41%	95%	99%

Table B
Appendix II-12**Project/programme costs and logframe targets**

Cost categories	2024	2025	2026	Total
A. By components				
C1. Market development	4,404	4,243	2,177	10,823
C2. Resilience Based Pasture and Livestock Management	1,326	1,150	1,177	3,652
C3. Project Management	438	375	415	1,229
Total costs, USD	6,168	5,768	3,769	15,704
Total costs, 000'MNT	20,875,751	19,519,936	12,754,401	53,150,088
B. By categories				
I. Investment costs				
A. Civil works	460	460	460	1,380
B. Vehicle and equipment	383	312	262	957
C. Goods, services, inputs	2,010	2,240	1,501	5,752
D. Training and workshop	163	53	93	309
E. Credit, guarantee fund	1,250	1,250	-	2,500
F. Project grants (UNIDO, Adaptation fund)	1,567	1,117	1,117	3,800
Sub-total investment costs	5,833	5,432	3,433	14,698
II. Recurrent costs				
A. Staff salaries and social insurance	249	249	249	747
B. Operations and maintenance	86	86	86	259
Sub-total investment costs	335	335	335	1,006
Total baseline costs	6,168	5,768	3,769	15,704
Economic costs				
A. Taxes	308	346	264	918
B. Credit, guarantee fund	1,250	1,250	-	2,500
C. Price contingencies	62	115	113	290
Total deductions	1,620	1,711	377	3,708
Total economic costs, USD	4,548	4,056	3,392	11,996
Total economic costs, 000'MNT	15,392,631	13,727,766	11,478,961	40,599,358
Beneficiaries/project logframe targets				
Number of beneficiary households	13,200	16,510	19,681	19,681
Cost per beneficiary, USD				798
Cost per beneficiary, MNT				2,700,579

Table C
Appendix II-13**Main assumptions and shadow prices**

No	Indicators	Type	Unit	Quantity	Prices and costs per unit, MNT	Note	Source
1	Discount rate		percent	13%	-	Central bank policy rate	
2	Exchange rate	USD		1	3,384.46	Official exchange rate	https://www.mongolbank.mn/mn/currency-rate
3	Standard conversion factor (SCF)		coef.	80%		Conversion factor of financial costs to economic costs	PMPMD Project Completion Report, 2024
4	Number of PHG member households		HH	43			PMPMD Project Completion Report, 2024
5	Number of PHGs		HH	240			PMPMD Project Completion Report, 2024
6	Average mortality rate	Cattle	percent	9%		Target soums' average	1212.mn, NSO
		Sheep	percent	8%			
		Goat	percent	7%			
7	Decrease in mortality rate		percent	1.0%			
8	Sheep-unit (SFU) coefficient	Horse	head	7			PMPMD Project Completion Report, 2024
		Cattle	head	6			
		Camel	head	5			
		Sheep	head	1			
		Goat	head	0.9			
9	Milk yield	Camel	liter/day	0.8	10,000	National average	MoFALI, MULS, MAAS. Agricultural Business Reference book, UB, 2010 Field trip survey
		Cow/Yak	liter/day	2	1,500		
		Red goat	liter/day	0.25	1,500		
10	Female animal share	Camel	percent	36.9%		National average	NSO. Agricultural Statistical Yearbook-2022, UB, 2023
		Cow/Yak	percent	40.0%			
		Red goat	percent	43.2%			
11	Numer of camels per camel farm			20		Bayankhongor	Field trip survey
12	Milk-dairy ratio		ratio	10:1			Field trip survey
13	Meat yield	Cattle/Yak	kg/head	180	12,000	National average	MoFALI, MULS, MAAS. Agricultural Business Reference book, UB, 2010 Field trip survey
		Sheep	kg/head	25	10,000		
		Goat	kg/head	18	8,000		
14	Slughtering share	Cattle/Yak	percent	22.0%		National average	NSO. Agricultural Statistical Yearbook-2022, UB, 2023
		Sheep	percent	33.9%			
		Goat	percent	32.5%			
15	Live sheep price	SFU	head		150,000	National average	1212.mn, NSO
16	Price of dairy product	Cow/goat/yak			40,000	Aggregated value	Field trip survey
17	Price of camel milk powder	Camel	kg		100,000		Field trip survey
18	Operation cost share in camel milk powder factory	Camel	percent	50.0%			Field trip survey
19	Operation cost share in meat factory	All animal	percent	60.0%			Field trip survey
20	Operation cost share in wool collection cooperative	Sheep	percent	80.0%			Field trip survey

21	Wool shearing productivity	Sheep	percent	120.0%			Field trip survey
22	Average wage rate		MNT		30,000	Per person/day, Minimum Wage Rate	Ministry of Labour and Social Protection https://mlsp.gov.mn/content/detail/3088
23	Pasture per household		ha	4.5		Natural hay, per t	PMPMD Project Completion Report, 2024
24	Pasture improvement productivity		t/ha	0.5		Natural hay increased as a result of project intervention, baseline is 1.32 t/ha	PMPMD Project Completion Report, 2025
25	Price of natural hay		MNT		500,000	Natural hay, per t	PMPMD Project Completion Report, 2024
26	Proxy values of labour		person-days	200		Under without project situation	PMPMD AF Project document, 2016

Table D
Appendix II-14

Beneficiary adoption rates and phasing

<i>Sub-projects</i>	<i>Base</i>	<i>PY1</i>	<i>PY2</i>	<i>PY3</i>	<i>Adoption rates</i>
PHGs	144	200	220	240	100%
Number of PHG households	6192	8,600	9,460	10,320	100%
Camel farm	0	5	10	20	100%
Red goat households	0	1,500	1,800	2,366	75%
Yak dairy households	0	2,000	3,500	4,695	75%
Camel milk AgroHub cooperatives (ar least one per soum)	0	3	4	6	100%
Member households of camel milk AgroHub cooperatives	0	100	250	300	75%
Non-food AgroHub cooperatives	0	10	15	20	100%
Member households of non-food AgroHub cooperatives	0	1,000	1,500	2,000	75%
Camel milk powder processing	1	1	1	1	100%
Meat processing	4	4	4	4	100%
Wool processing	1	1	1	1	100%
Feed processing	0	10	12	15	100%
Total beneficiary households		13,200	16,510	19,681	
Total cooperatives		13	19	26	
Total SMEs		16	18	21	

Table E

Economic cash flow

Appendix II-15

Summary of economic analysis for subprojects

Year	PHG household	Camel farm	Red goat dairy household	Yak dairy household	Camel milk AgroHub	Non-food AgroHub	Camel milk SME	Meat processing SME	Wool processing SME	Feed processing SME	Total
Y1 - 2024	-	(37,600)	(3,038,755)	(1,600,000)	(555,000)	(120,000)	(535,000)	(432,000)	(1,110,000)	(284,000)	(7,712,355)
Y2 - 2025	-	(113,600)	(1,528,252)	(3,738,736)	(740,000)	(180,000)	(532,600)	(432,000)	(1,110,000)	(283,200)	(8,658,388)
Y3 - 2026	10,930,944	16,000	1,477,030	(3,294,796)	226,800	180,533	288,800	627,917	870,000	231,000	11,554,228
Y4 - 2027	10,930,944	116,000	2,470,586	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,486,626
Y5 - 2028	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
Y6 - 2029	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
Y7 - 2030	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
Y8 - 2031	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
Y9 - 2032	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
Y10 - 2033	10,930,944	116,000	2,506,718	5,614,047	736,800	180,533	708,800	627,917	870,000	231,000	22,522,759
NPV (MNT'000)	41,080,029	244,400	4,798,806	10,580,198	1,344,864	431,306	1,482,134	1,639,180	1,417,989	395,016	63,413,921
NPV (USD'000)	12,138	72	1,418	3,126	397	127	438	484	419	117	18,737
FIRR	None	47%	36%	43%	36%	48%	42%	55%	30%	31%	78%

Appendix II-16

PHG household subproject model**b. Economic budget estimation**

	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	(MNT'000)
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Without project											
Main production											
Pasture productivity	20,433,600	22,476,960	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320
Mortality reduction	-	-	-	-	-	-	-	-	-	-	-
Sub-total	20,433,600	22,476,960	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320	24,520,320
With project											
Main production											
Pasture productivity	20,433,600	22,476,960	26,972,352	26,972,352	26,972,352	26,972,352	26,972,352	26,972,352	26,972,352	26,972,352	26,972,352
Mortality reduction	-	-	8,478,912	8,478,912	8,478,912	8,478,912	8,478,912	8,478,912	8,478,912	8,478,912	8,478,912
Sub-total	20,433,600	22,476,960	35,451,264	35,451,264	35,451,264	35,451,264	35,451,264	35,451,264	35,451,264	35,451,264	35,451,264
Increments	-	-	10,930,944	10,930,944	10,930,944	10,930,944	10,930,944	10,930,944	10,930,944	10,930,944	10,930,944
IRR =	None		NPV = 41,080,029								

Appendix II-17

Camel farm subproject model

b. Economic budget estimation											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	-	-	-	-	-	-	-	-	-	-	
Proxy workdays	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	
Sub-total income	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	
Production cost											
	-	-	-	-	-	-	-	-	-	-	
Sub-total cost	-	-	-	-	-	-	-	-	-	-	
Sub-total benefit	30,000	18,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	
With project											
Main production											
Sales income	-	-	512,000	768,000	768,000	768,000	768,000	768,000	768,000	768,000	
Proxy workdays	30,000	12,000	-	-	-	-	-	-	-	-	
Sub-total income	30,000	12,000	512,000	768,000	768,000	768,000	768,000	768,000	768,000	768,000	
Production cost											
Salary	30,000	60,000	300,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	
Forage and hay	-	30,000	120,000	192,000	192,000	192,000	192,000	192,000	192,000	192,000	
Fuel	3,600	9,600	24,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	
Miscellaneous	4,000	8,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	
Sub-total cost	37,600	107,600	460,000	616,000	616,000	616,000	616,000	616,000	616,000	616,000	
Sub-total benefit	(7,600)	(95,600)	52,000	152,000	152,000	152,000	152,000	152,000	152,000	152,000	
Total incremental benefits	(37,600)	(113,600)	16,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000	
	IRR =	47%		NPV =	244,400						

Appendix II-18

Red goat dairy subproject model

b. Economic budget estimation										(MNT'000)
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033
Without project										
Main production										
Sales income	5,639,232	6,767,078	8,894,949	8,894,949	8,894,949	8,894,949	8,894,949	8,894,949	8,894,949	8,894,949
Proxy workdays	1,800,000	2,160,000	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200	2,839,200
Sub-total income	7,439,232	8,927,078	11,734,149	11,734,149	11,734,149	11,734,149	11,734,149	11,734,149	11,734,149	11,734,149
Production cost										
Salary	6,750,000	8,100,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000	10,647,000
Fodder and hay	845,885	1,015,062	1,334,242	1,334,242	1,334,242	1,334,242	1,334,242	1,334,242	1,334,242	1,334,242
Fuel	720,000	864,000	1,135,680	1,135,680	1,135,680	1,135,680	1,135,680	1,135,680	1,135,680	1,135,680
Miscellaneous	600,000	720,000	946,400	946,400	946,400	946,400	946,400	946,400	946,400	946,400
Sub-total cost	8,915,885	10,699,062	14,063,322	14,063,322	14,063,322	14,063,322	14,063,322	14,063,322	14,063,322	14,063,322
Sub-total benefit	(1,476,653)	(1,771,983)	(2,329,174)	(2,329,174)	(2,329,174)	(2,329,174)	(2,329,174)	(2,329,174)	(2,329,174)	(2,329,174)
With project										
Main production										
Sales income	5,639,231.97	10,540,800	17,780,963	20,782,944	23,380,812	23,380,812	23,380,812	23,380,812	23,380,812	23,380,812
Proxy workdays	-	-	-	-	-	-	-	-	-	-
Sub-total income	5,639,232	10,540,800	17,780,963	20,782,944	23,380,812	23,380,812	23,380,812	23,380,812	23,380,812	23,380,812
Production cost										
Salary	6,750,000	8,343,000	11,295,402	11,634,264	14,196,000	14,196,000	14,196,000	14,196,000	14,196,000	14,196,000
Fodder and hay	1,844,640	3,626,035	4,877,064	6,546,627	6,546,627	6,546,627	6,546,627	6,546,627	6,546,627	6,546,627
Fuel	960,000	1,152,000	1,514,240	1,514,240	1,514,240	1,514,240	1,514,240	1,514,240	1,514,240	1,514,240
Miscellaneous	600,000	720,000	946,400	946,400	946,400	946,400	946,400	946,400	946,400	946,400
Sub-total cost	10,154,640	13,841,035	18,633,106	20,641,532	23,203,267	23,203,267	23,203,267	23,203,267	23,203,267	23,203,267
Sub-total benefit	(4,515,408)	(3,300,235)	(852,143)	141,412	177,545	177,545	177,545	177,545	177,545	177,545
Total incremental benefits	(3,038,755)	(1,528,252)	1,477,030	2,470,586	2,506,718	2,506,718	2,506,718	2,506,718	2,506,718	2,506,718
	IRR =	36%		NPV =	4,798,806					

Appendix II-19

Yak dairy subproject model

b. Economic budget estimation										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Without project										
Main production										
Sales income	18,071,592	31,625,286	42,423,062	42,423,062	42,423,062	42,423,062	42,423,062	42,423,062	42,423,062	42,423,062
Proxy workdays	3,600,000	6,300,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000	8,451,000
Sub-total income	21,671,592	37,925,286	50,874,062	50,874,062	50,874,062	50,874,062	50,874,062	50,874,062	50,874,062	50,874,062
Production cost										
Salary	12,000,000	21,000,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000	28,170,000
Fodder and hay	2,439,665	4,269,414	5,727,113	5,727,113	5,727,113	5,727,113	5,727,113	5,727,113	5,727,113	5,727,113
Fuel	2,400,000	4,200,000	5,634,000	5,634,000	5,634,000	5,634,000	5,634,000	5,634,000	5,634,000	5,634,000
Miscellaneous	800,000	1,400,000	1,878,000	1,878,000	1,878,000	1,878,000	1,878,000	1,878,000	1,878,000	1,878,000
Sub-total cost	17,639,665	30,869,414	41,409,113	41,409,113	41,409,113	41,409,113	41,409,113	41,409,113	41,409,113	41,409,113
Sub-total benefit	4,031,927	7,055,872	9,464,948	9,464,948	9,464,948	9,464,948	9,464,948	9,464,948	9,464,948	9,464,948
With project										
Main production										
Sales income	18,071,592	33,206,550	53,453,058	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900
Proxy workdays	3,600,000	3,780,000	-	-	-	-	-	-	-	-
Sub-total income	21,671,592	36,986,550	53,453,058	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900	62,361,900
Production cost										
Salary	12,000,000	21,000,000	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100	29,015,100
Fodder and hay	2,439,665	4,269,414	6,999,805	6,999,805	6,999,805	6,999,805	6,999,805	6,999,805	6,999,805	6,999,805
Fuel	3,200,000	5,600,000	7,512,000	7,512,000	7,512,000	7,512,000	7,512,000	7,512,000	7,512,000	7,512,000
Miscellaneous	1,600,000	2,800,000	3,756,000	3,756,000	3,756,000	3,756,000	3,756,000	3,756,000	3,756,000	3,756,000
Sub-total cost	19,239,665	33,669,414	47,282,905	47,282,905	47,282,905	47,282,905	47,282,905	47,282,905	47,282,905	47,282,905
Sub-total benefit	2,431,927	3,317,136	6,170,152	15,078,995	15,078,995	15,078,995	15,078,995	15,078,995	15,078,995	15,078,995
Total incremental benefits	(1,600,000)	(3,738,736)	(3,294,796)	5,614,047	5,614,047	5,614,047	5,614,047	5,614,047	5,614,047	5,614,047
IRR =		43%		NPV =	10,580,198					

Appendix II-20

Camel milk AgroHub subproject model

b. Economic budget estimation											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	-	-	-	-	-	-	-	-	-	-	
Proxy workdays	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
Sub-total income	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
Production cost											
	-	-	-	-	-	-	-	-	-	-	
Sub-total cost	-	-	-	-	-	-	-	-	-	-	
Sub-total benefit	18,000	4,800	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
With project											
Main production											
Sales income	-	-	8,064,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	
Proxy workdays	18,000	4,800	-	-	-	-	-	-	-	-	
Sub-total income	18,000	4,800	8,064,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	12,096,000	
Production cost											
Salary	375,000	500,000	750,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	
Milk purchase	-	-	6,720,000	10,080,000	10,080,000	10,080,000	10,080,000	10,080,000	10,080,000	10,080,000	
Fuel	144,000	192,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	
Electricity	12,000	16,000	24,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	
Miscellaneous	24,000	32,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	
Sub-total cost	555,000	740,000	7,830,000	11,352,000	11,352,000	11,352,000	11,352,000	11,352,000	11,352,000	11,352,000	
Sub-total benefit	(537,000)	(735,200)	234,000	744,000	744,000	744,000	744,000	744,000	744,000	744,000	
Total incremental benefits	(555,000)	(740,000)	226,800	736,800	736,800	736,800	736,800	736,800	736,800	736,800	
	IRR =	36%		NPV =	1,344,864						

Appendix II-21

Non-food AgroHub subproject model

<i>b. Economic budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
<i>Without project</i>											
Main production											
Wool sells	612,701	919,052	1,225,402	1,225,402	1,225,402	1,225,402	1,225,402	1,225,402	1,225,402	1,225,402	
Hide sells	266,185	399,277	532,369	532,369	532,369	532,369	532,369	532,369	532,369	532,369	
Sheep skin sells	103,853	155,779	207,706	207,706	207,706	207,706	207,706	207,706	207,706	207,706	
Goat skin sells	920,915	1,381,373	1,841,830	1,841,830	1,841,830	1,841,830	1,841,830	1,841,830	1,841,830	1,841,830	
Sub-total income	1,903,654	2,855,481	3,807,308	3,807,308	3,807,308	3,807,308	3,807,308	3,807,308	3,807,308	3,807,308	
Production cost											
Wool purchase	306,351	459,526	612,701	612,701	612,701	612,701	612,701	612,701	612,701	612,701	
Hide purchase	199,639	299,458	399,277	399,277	399,277	399,277	399,277	399,277	399,277	399,277	
Sheep skin sells	51,926	77,890	103,853	103,853	103,853	103,853	103,853	103,853	103,853	103,853	
Goat skin purchase	690,686	1,036,030	1,381,373	1,381,373	1,381,373	1,381,373	1,381,373	1,381,373	1,381,373	1,381,373	
Salary	200,000	300,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	
Fuel	240,000	360,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	
Miscellaneous	80,000	120,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	
Sub-total cost	1,768,602	2,652,903	3,537,204	3,537,204	3,537,204	3,537,204	3,537,204	3,537,204	3,537,204	3,537,204	
Sub-total benefit	135,052	202,578	270,104	270,104	270,104	270,104	270,104	270,104	270,104	270,104	
<i>With project</i>											
Main production											
Wool sells	612,701	919,052	1,838,103	1,838,103	1,838,103	1,838,103	1,838,103	1,838,103	1,838,103	1,838,103	
Hide sells	266,185	399,277	665,462	665,462	665,462	665,462	665,462	665,462	665,462	665,462	
Sheep skin sells	103,853	155,779	311,558	311,558	311,558	311,558	311,558	311,558	311,558	311,558	
Goat skin sells	920,915	1,381,373	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	2,302,288	
Sub-total income	1,903,654	2,855,481	5,117,412	5,117,412	5,117,412	5,117,412	5,117,412	5,117,412	5,117,412	5,117,412	
Production cost											
Wool purchase	306,351	459,526	882,290	882,290	882,290	882,290	882,290	882,290	882,290	882,290	
Hide purchase	199,639	299,458	479,133	479,133	479,133	479,133	479,133	479,133	479,133	479,133	
Sheep skin sells	51,926	77,890	207,706	207,706	207,706	207,706	207,706	207,706	207,706	207,706	
Goat skin purchase	690,686	1,036,030	1,657,647	1,657,647	1,657,647	1,657,647	1,657,647	1,657,647	1,657,647	1,657,647	
Salary	320,000	480,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	
Fuel	240,000	360,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	480,000	
Miscellaneous	80,000	120,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000	
Sub-total cost	1,888,602	2,832,903	4,666,775	4,666,775	4,666,775	4,666,775	4,666,775	4,666,775	4,666,775	4,666,775	
Sub-total benefit	15,052	22,578	450,636	450,636	450,636	450,636	450,636	450,636	450,636	450,636	
Total incremental benefits	(120,000)	(180,000)	180,533	180,533	180,533	180,533	180,533	180,533	180,533	180,533	
	IRR =	48%		NPV =	431,306						

Appendix II-22

Camel milk powder processing subproject model

b. Economic budget estimation											(MNT'000)
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	-	-	-	-	-	-	-	-	-	-	
Proxy workdays	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Sub-total income	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Production cost											
	-	-	-	-	-	-	-	-	-	-	
Sub-total cost	-	-	-	-	-	-	-	-	-	-	
Sub-total benefit	6,000	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
With project											
Main production											
Sales income	-	-	2,625,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	
Proxy workdays	6,000	3,600	-	-	-	-	-	-	-	-	
Sub-total income	6,000	3,600	2,625,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	4,200,000	
Production cost											
Salary	375,000	375,000	375,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	
Milk purchase	-	-	1,800,000	2,880,000	2,880,000	2,880,000	2,880,000	2,880,000	2,880,000	2,880,000	
Fuel	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	
Electricity	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	
Miscellaneous	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	
Sub-total cost	535,000	535,000	2,335,000	3,490,000	3,490,000	3,490,000	3,490,000	3,490,000	3,490,000	3,490,000	
Sub-total benefit	(529,000)	(531,400)	290,000	710,000	710,000	710,000	710,000	710,000	710,000	710,000	
Total incremental benefits	(535,000)	(532,600)	288,800	708,800	708,800	708,800	708,800	708,800	708,800	708,800	
	IRR =		42%		NPV =		1,482,134				

Appendix II-23

Meat processing subproject model

<i>b. Economic budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	16,220,360	16,220,360	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	
Proxy workdays	-	-	-	-	-	-	-	-	-	-	
Sub-total income	16,220,360	16,220,360	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	24,330,394	
Production cost											
Salary	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	2,160,000	
Animal sourcing	11,980,800	11,980,800	17,971,200	17,971,200	17,971,200	17,971,200	17,971,200	17,971,200	17,971,200	17,971,200	
Fuel	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	
Electricity	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	
Miscellaneous	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	
Sub-total cost	15,100,800	15,100,800	21,091,200	21,091,200	21,091,200	21,091,200	21,091,200	21,091,200	21,091,200	21,091,200	
Sub-total benefit	1,119,560	1,119,560	3,239,194	3,239,194	3,239,194	3,239,194	3,239,194	3,239,194	3,239,194	3,239,194	
With project											
Main production											
Sales income	16,220,360	16,220,360	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	
Proxy workdays	-	-	-	-	-	-	-	-	-	-	
Sub-total income	16,220,360	16,220,360	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	28,385,510	
Production cost											
Salary	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	2,592,000	
Animal sourcing	11,980,800	11,980,800	20,966,400	20,966,400	20,966,400	20,966,400	20,966,400	20,966,400	20,966,400	20,966,400	
Fuel	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	576,000	
Electricity	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	
Miscellaneous	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	320,000	
Sub-total cost	15,532,800	15,532,800	24,518,400	24,518,400	24,518,400	24,518,400	24,518,400	24,518,400	24,518,400	24,518,400	
Sub-total benefit	687,560	687,560	3,867,110	3,867,110	3,867,110	3,867,110	3,867,110	3,867,110	3,867,110	3,867,110	
Total incremental benefits	(432,000)	(432,000)	627,917	627,917	627,917	627,917	627,917	627,917	627,917	627,917	
IRR =		55%		NPV =		1,639,180					

Appendix II-24

Wool processing subproject model

<i>b. Economic budget estimation</i>										
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Without project										
Main production										
Sales income	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000
Proxy workdays	-	-	-	-	-	-	-	-	-	-
Sub-total income	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000	4,320,000
Production cost										
Salary	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Animal sourcing	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000	1,440,000
Fuel	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Electricity	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Miscellaneous	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Sub-total cost	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000	4,714,000
Sub-total benefit	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)	(394,000)
With project										
Main production										
Sales income	4,320,000	4,320,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000
Proxy workdays	-	-	-	-	-	-	-	-	-	-
Sub-total income	4,320,000	4,320,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000	7,200,000
Production cost										
Salary	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000	3,750,000
Animal sourcing	1,800,000	1,800,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Fuel	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Electricity	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Miscellaneous	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000
Sub-total cost	5,824,000	5,824,000	6,724,000	6,724,000	6,724,000	6,724,000	6,724,000	6,724,000	6,724,000	6,724,000
Sub-total benefit	(1,504,000)	(1,504,000)	476,000	476,000	476,000	476,000	476,000	476,000	476,000	476,000
Total incremental benefits	(1,110,000)	(1,110,000)	870,000	870,000	870,000	870,000	870,000	870,000	870,000	870,000
	IRR = 30%		NPV = 1,417,989							

Appendix II-25
Feed processing subproject model

<i>b. Economic budget estimation</i>											<i>(MNT'000)</i>
Activities	Y1 2024	Y2 2025	Y3 2026	Y4 2027	Y5 2028	Y6 2029	Y7 2030	Y8 2031	Y9 2032	Y10 2033	
Without project											
Main production											
Sales income	-	-	-	-	-	-	-	-	-	-	
Proxy workdays	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	
Sub-total income	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	
Production cost											
	-	-	-	-	-	-	-	-	-	-	
Sub-total cost	-	-	-	-	-	-	-	-	-	-	
Sub-total benefit	60,000	14,400	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	
With project											
Main production											
Sales income	2,500,000	3,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	
Proxy workdays	-	-	-	-	-	-	-	-	-	-	
Sub-total income	2,500,000	3,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	
Production cost											
Salary	600,000	720,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	
Forage and ingredients	1,850,000	2,220,000	4,440,000	4,440,000	4,440,000	4,440,000	4,440,000	4,440,000	4,440,000	4,440,000	
Fuel	144,000	172,800	216,000	216,000	216,000	216,000	216,000	216,000	216,000	216,000	
Electricity	50,000	60,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	
Miscellaneous	80,000	96,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	
Sub-total cost	2,724,000	3,268,800	5,751,000	5,751,000	5,751,000	5,751,000	5,751,000	5,751,000	5,751,000	5,751,000	
Sub-total benefit	(224,000)	(268,800)	249,000	249,000	249,000	249,000	249,000	249,000	249,000	249,000	
Total incremental benefits	(284,000)	(283,200)	231,000	231,000	231,000	231,000	231,000	231,000	231,000	231,000	
	IRR =	31%		NPV =	395,016						

Table F
Appendix II-26**Sensitivity analysis results – AF 2024-2033**

Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	23,744,986	26,043,140	44,865,308	40,227,773	42,789,508	42,789,508	42,789,508	42,789,508	42,789,508	42,789,508
Incremental net benefits	(23,104,986)	(22,386,154)	75,267	22,486,626	22,522,759	22,522,759	22,522,759	22,522,759	22,522,759	22,522,759
EIRR =		28%	NPVb =	233,171,114	NPVc =	202,085,340	NPVnb =	31,085,774	BCR =	1.15
Costs increased by 5%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	24,932,235.36	27,345,296.76	47,108,573.37	42,239,161.22	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63
Incremental net benefits	(24,292,235)	(23,688,311)	(2,167,998)	20,475,238	20,383,283	20,383,283	20,383,283	20,383,283	20,383,283	20,383,283
EIRR =		23%	NPVb =	233,171,114	NPVc =	212,189,607	NPVnb =	20,981,507	BCR =	1.10
Costs increased by 10%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	26,119,484.66	28,647,453.75	49,351,838.76	44,250,549.84	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04
Incremental net benefits	(25,479,485)	(24,990,468)	(4,411,263)	18,463,849	18,243,808	18,243,808	18,243,808	18,243,808	18,243,808	18,243,808
EIRR =		18%	NPVb =	233,171,114	NPVc =	222,293,874	NPVnb =	10,877,240	BCR =	1.05
Costs increased by 10%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	27,306,733.96	29,949,610.74	51,595,104.16	46,261,938.47	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45
Incremental net benefits	(26,666,734)	(26,292,625)	(6,654,529)	16,452,461	16,104,333	16,104,333	16,104,333	16,104,333	16,104,333	16,104,333
EIRR =		13%	NPVb =	233,171,114	NPVc =	232,398,141	NPVnb =	772,973	BCR =	1.00
Benefits decreased by 5%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	608,000	3,474,137	42,693,547	59,578,679	62,046,654	62,046,654	62,046,654	62,046,654	62,046,654	62,046,654
Incremental costs	23,744,986.05	26,043,139.77	44,865,307.97	40,227,772.59	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22
Incremental net benefits	(23,136,986)	(22,569,003)	(2,171,761)	19,350,907	19,257,145	19,257,145	19,257,145	19,257,145	19,257,145	19,257,145
EIRR =		23%	NPVb =	221,512,558	NPVc =	202,085,340	NPVnb =	19,427,218	BCR =	1.10
Benefits decreased by 10%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	576,000	3,291,287	40,446,518	56,442,959	58,781,040	58,781,040	58,781,040	58,781,040	58,781,040	58,781,040
Incremental costs	23,744,986.05	26,043,139.77	44,865,307.97	40,227,772.59	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22
Incremental net benefits	(23,168,986)	(22,751,852)	(4,418,790)	16,215,187	15,991,532	15,991,532	15,991,532	15,991,532	15,991,532	15,991,532
EIRR =		17%	NPVb =	209,854,003	NPVc =	202,085,340	NPVnb =	7,768,662	BCR =	1.04
Benefits decreased by 15%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	544,000	3,108,438	38,199,489	53,307,239	55,515,427	55,515,427	55,515,427	55,515,427	55,515,427	55,515,427
Incremental costs	23,744,986.05	26,043,139.77	44,865,307.97	40,227,772.59	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22

Incremental net benefits	(23,200,986)	(22,934,702)	(6,665,819)	13,079,467	12,725,919	12,725,919	12,725,919	12,725,919	12,725,919	12,725,919
EIRR =		11%	NPVb =	198,195,447	NPVc =	202,085,340	NPVnb =	(3,889,893)	BCR =	0.98
Both costs increased 5% and benefits decreased by 5%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	608,000	3,474,137	42,693,547	59,578,679	62,046,654	62,046,654	62,046,654	62,046,654	62,046,654	62,046,654
Incremental costs	24,932,235.36	27,345,296.76	47,108,573.37	42,239,161.22	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63	44,928,983.63
Incremental net benefits	(24,324,235)	(23,871,160)	(4,415,027)	17,339,518	17,117,670	17,117,670	17,117,670	17,117,670	17,117,670	17,117,670
EIRR =		18%	NPVb =	221,512,558	NPVc =	212,189,607	NPVnb =	9,322,951	BCR =	1.04
Both costs increased 10% and benefits decreased by 10%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	576,000	3,291,287	40,446,518	56,442,959	58,781,040	58,781,040	58,781,040	58,781,040	58,781,040	58,781,040
Incremental costs	26,119,484.66	28,647,453.75	49,351,838.76	44,250,549.84	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04	47,068,459.04
Incremental net benefits	(25,543,485)	(25,356,166)	(8,905,321)	12,192,409	11,712,581	11,712,581	11,712,581	11,712,581	11,712,581	11,712,581
EIRR =		6%	NPVb =	209,854,003	NPVc =	222,293,874	NPVnb =	(12,439,872)	BCR =	0.94
Both costs increased 15% and benefits decreased by 15%										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	544,000	3,108,438	38,199,489	53,307,239	55,515,427	55,515,427	55,515,427	55,515,427	55,515,427	55,515,427
Incremental costs	27,306,733.96	29,949,610.74	51,595,104.16	46,261,938.47	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45	49,207,934.45
Incremental net benefits	(26,762,734)	(26,841,173)	(13,395,615)	7,045,301	6,307,493	6,307,493	6,307,493	6,307,493	6,307,493	6,307,493
EIRR =		-7%	NPVb =	198,195,447	NPVc =	232,398,141	NPVnb =	(34,202,695)	BCR =	0.85
Benefits lagged by 1 year										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits		640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	23,744,986.05	26,043,139.77	44,865,307.97	40,227,772.59	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22
Incremental net benefits	(23,744,986)	(25,403,140)	(41,208,322)	4,712,803	19,924,891	22,522,759	22,522,759	22,522,759	22,522,759	22,522,759
EIRR =		8%	NPVb =	213,930,881	NPVc =	202,085,340	NPVnb =	(12,765,977)	BCR =	1.06
Benefits lagged by 2 years										
Activities	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits			640,000	3,656,986	44,940,575	62,714,399	65,312,267	65,312,267	65,312,267	65,312,267
Incremental costs	23,744,986.05	26,043,139.77	44,865,307.97	40,227,772.59	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22	42,789,508.22
Incremental net benefits	(23,744,986)	(26,043,140)	(44,225,308)	(36,570,787)	2,151,067	19,924,891	22,522,759	22,522,759	22,522,759	22,522,759
EIRR =		-3%	NPVb =	192,189,418	NPVc =	202,085,340	NPVnb =	(51,572,835)	BCR =	0.95

Appendix II-27

Sensitivity analysis results – Overall project 2012-2033

																<i>(USD'000)</i>	
Activities	2012	2015	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Incremental benefits	247	2,943	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235	20,112	20,013	
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198	
Incremental net benefits	(386)	160	(452)	(447)	516	2,212	(3,623)	(4,098)	1,989	7,912	7,622	7,382	7,190	7,037	6,914	6,815	
								EIRR =	25%	NPVb =	32,775	NPVc =	28,815	NPVnb =	3,959	BCR =	1.14
Costs increased by 5%																	
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Incremental benefits	247	2,943	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235	20,112	20,013	
Incremental costs	664.45	2,922	4,804	5,002	5,276	2,786	7,950	8,663	14,502	13,063	13,858	13,858	13,858	13,858	13,858	13,858	
Incremental net benefits	(417)	21	(680)	(685)	264	2,079	(4,001)	(4,510)	1,299	7,290	6,963	6,722	6,530	6,377	6,254	6,155	
								EIRR =	20%	NPVb =	32,775	NPVc =	30,256	NPVnb =	2,518	BCR =	1.08
Costs increased by 10%																	
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Incremental benefits	247	2,943	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235	20,112	20,013	
Incremental costs	696	3,061	5,032	5,240	5,527	2,919	8,328	9,075	15,193	13,685	14,518	14,518	14,518	14,518	14,518	14,518	
Incremental net benefits	(449)	(118)	(909)	(923)	13	1,946	(4,380)	(4,923)	608	6,668	6,303	6,062	5,870	5,717	5,594	5,495	
								EIRR =	16%	NPVb =	32,775	NPVc =	31,697	NPVnb =	1,078	BCR =	1.03
Costs increased by 15%																	
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Incremental benefits	247	2,943	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235	20,112	20,013	
Incremental costs	728	3,200	5,261	5,479	5,778	3,052	8,707	9,488	15,883	14,307	15,178	15,178	15,178	15,178	15,178	15,178	
Incremental net benefits	(480)	(257)	(1,138)	(1,162)	(238)	1,814	(4,758)	(5,335)	(83)	6,046	5,643	5,403	5,210	5,057	4,934	4,836	
								EIRR =	12%	NPVb =	32,775	NPVc =	33,138	NPVnb =	(363)	BCR =	0.99
Benefits decreased by 5%																	
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
Incremental benefits	235	2,796	3,917	4,101	5,263	4,622	3,751	3,945	15,010	19,335	19,779	19,551	19,369	19,223	19,106	19,013	
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198	

Incremental net benefits	(398)	13	(658)	(663)	239	1,968	(3,820)	(4,305)	1,199	6,894	6,581	6,353	6,171	6,025	5,908	5,815
							EIRR =	20%	NPVb =	31,136	NPVc =	28,815	NPVnb =	2,321	BCR =	1.08
Benefits decreased by 10%																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	223	2,649	3,711	3,885	4,986	4,379	3,554	3,737	14,220	18,318	18,738	18,522	18,349	18,211	18,100	18,012
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198
Incremental net benefits	(410)	(134)	(864)	(879)	(38)	1,725	(4,017)	(4,513)	409	5,877	5,540	5,324	5,151	5,013	4,902	4,814
							EIRR =	15%	NPVb =	29,497	NPVc =	28,815	NPVnb =	682	BCR =	1.02
Benefits decreased by 15%																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	210	2,502	3,505	3,670	4,709	4,135	3,356	3,530	13,430	17,300	17,697	17,493	17,330	17,199	17,095	17,011
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198
Incremental net benefits	(423)	(281)	(1,070)	(1,094)	(315)	1,482	(4,215)	(4,720)	(381)	4,859	4,499	4,295	4,132	4,001	3,897	3,813
							EIRR =	10%	NPVb =	27,858	NPVc =	28,815	NPVnb =	(957)	BCR =	0.97
Both costs increased 5% and benefits decreased by 5%																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	235	2,796	3,917	4,101	5,263	4,622	3,751	3,945	15,010	19,335	19,779	19,551	19,369	19,223	19,106	19,013
Incremental costs	664	2,922	4,804	5,002	5,276	2,786	7,950	8,663	14,502	13,063	13,858	13,858	13,858	13,858	13,858	13,858
Incremental net benefits	(430)	(126)	(886)	(901)	(13)	1,836	(4,199)	(4,718)	508	6,272	5,922	5,693	5,511	5,365	5,248	5,155
							EIRR =	15%	NPVb =	31,136	NPVc =	30,256	NPVnb =	880	BCR =	1.03
Both costs increased 10% and benefits decreased by 10%																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	223	2,649	3,711	3,885	4,986	4,379	3,554	3,737	14,220	18,318	18,738	18,522	18,349	18,211	18,100	18,012
Incremental costs	696	3,061	5,032	5,240	5,527	2,919	8,328	9,075	15,193	13,685	14,518	14,518	14,518	14,518	14,518	14,518
Incremental net benefits	(474)	(412)	(1,321)	(1,355)	(541)	1,460	(4,774)	(5,338)	(972)	4,632	4,221	4,004	3,832	3,693	3,583	3,494
							EIRR =	7%	NPVb =	29,497	NPVc =	31,697	NPVnb =	(2,200)	BCR =	0.93
Both costs increased 15% and benefits decreased by 15%																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits	210	2,502	3,505	3,670	4,709	4,135	3,356	3,530	13,430	17,300	17,697	17,493	17,330	17,199	17,095	17,011
Incremental costs	728	3,200	5,261	5,479	5,778	3,052	8,707	9,488	15,883	14,307	15,178	15,178	15,178	15,178	15,178	15,178

Incremental net benefits	(518)	(699)	(1,756)	(1,809)	(1,069)	1,084	(5,350)	(5,958)	(2,453)	2,993	2,520	2,316	2,152	2,022	1,917	1,834
							EIRR =	-4%	NPVb =	27,858	NPVc =	33,138	NPVnb =	(5,279)	BCR =	0.84
Benefits lagged by 1 year																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits		2,487	1,852	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235	20,112
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198
Incremental net benefits	(633)	(296)	(2,723)	(641)	(707)	2,886	(2,706)	(4,302)	(9,659)	3,359	7,155	7,622	7,382	7,190	7,037	6,914
							EIRR =	11%	NPVb =	31,414	NPVc =	28,815	NPVnb =	(1,015)	BCR =	1.09
Benefits lagged by 2 years																
Activities							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental benefits		856	2,234	1,852	4,123	4,317	5,540	4,865	3,948	4,152	15,800	20,353	20,820	20,580	20,388	20,235
Incremental costs	633	2,783	4,575	4,764	5,024	2,654	7,571	8,250	13,811	12,441	13,198	13,198	13,198	13,198	13,198	13,198
Incremental net benefits	(633)	(1,927)	(2,341)	(2,913)	(901)	1,664	(2,031)	(3,385)	(9,863)	(8,289)	2,602	7,155	7,622	7,382	7,190	7,037
							EIRR =	3%	NPVb =	29,870	NPVc =	28,815	NPVnb =	(5,423)	BCR =	1.04