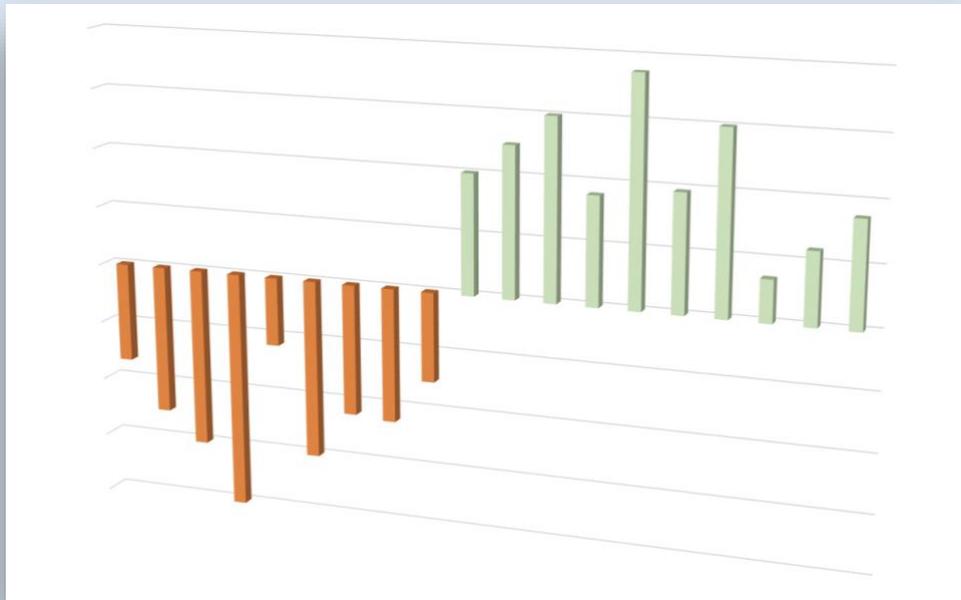


HOW TO BALANCE WASTE MANAGEMENT BUDGET AT THE SOUM LEVEL?

CALCULATION TOOL AND RECOMMENDATION REPORT



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INTRODUCTION

Since 2018, Ecosoum has been working on setting up a proper waste management system in Khishig-Undur soum, Bulgan aimag, with the initial and renewed support of The Asia Foundation. From 2020, Ecosoum’s activities became a part of the “Sustainable Plastic Recycling in Mongolia” project funded by the SWITCH-Asia-II program of the European Union¹, in partnership with four other partners working at the aimag and Ulaanbaatar level.

In addition to all the reports and documents produced until now², and more specifically to support and complete Ecosoum’s guidebook entitled *How to set up waste management at the soum level*³, this brief report aims to introduce a budget calculation tool and clarify the orders of magnitude for unavoidable expenses and possible incomes linked to soum-level waste management systems - based on the example of Khishig-Undur soum.

This report is associated with an Excel table, available on Ecosoum’s website, which acts as a semi-automatic calculation tool that enables simple estimation of realistic waste management budget depending on several parameters such distance from soum to Ulaanbaatar, number of households in the soum, price of gas, etc.

The main purpose of this report and associated calculation tool is to provide soum-level actors with rough estimation of waste management-related expenses and incomes to make adequate decisions and integrate them in their local Waste Management Master Plans.

Incidentally, this report also aims to highlight and demonstrate the absolute necessity for large consumer-goods companies (at the origin of most household waste) to contribute to balance waste management budgets, as already stated in our *Zero-Waste and Circular Economy*⁴ and *Who produces our waste?*⁵ reports.

WORK HYPOTHESES AND CALCULATION PARAMETERS

MAIN VARIABLES

To construct our budget calculation tool, we started by drafting an accurate estimation table of all expenses and incomes (already incurred or anticipated in the near future) associated with waste management in Khishig-Undur soum. Once the table was complete, relevant parameters were linked to the number of household (either soum-center households or total households including herders, depending on parameters) so as to enable extrapolation for all Mongolian soums based on the size of their population.

Similarly, relevant parameters were also put in relation to the distance between the soum and Ulaanbaatar, where most recycling and reusing industries are located. This way, extrapolation can also be applied based on distance considerations.

¹ www.switch-asia.eu/project/sustainable-plastic-recycling-in-mongolia/

² All Ecosoum reports and resources are available on Ecosoum’s website (www.ecosoum.org/en-resources-and-reports).

³ Ecosoum, *How to set up waste management at the soum level*, 2021.

⁴ Ecosoum, *Zero Waste and Circular Economy: The Way Forward*, 2021.

⁵ Ecosoum, *Who produces our waste? - Brand audit report*, 2022.

Therefore, the main three variables in this calculation tools are: number of soum-center households, number of herder households, and distance from soum to Ulaanbaatar. The values used for the example of Khishig-Undur were respectively 330 (soum-center households), 658 (herder households),⁶ and 300 (km).

Three other variables associated with transportation were included in the tool to simplify modification for these fast-evolving parameters: price of gas, gas consumption (which depends on the trucks that are used), transportation fee for one ton from soum to Ulaanbaatar. The price of gas used in our example is the current (early May, 2022) diesel price observed in Khishig-Undur soum: 3,280 MNT per liter. The selected gas consumption for waste management truck was 20 liters per 100 kilometers, which corresponds to the minimum average consumption for such trucks. Finally, the transportation fee per ton (by private transportation contractor) was extrapolated from real current price applied in Khishig-Undur (120,000 MNT per ton for 300 km distance), which is equivalent to 400 MNT per ton per kilometer.

By modifying one or several of these 6 variables depending on features of a given soum and/or evolution in transpiration-related parameters, approximative waste management budget (expenses and incomes) can quickly be calculated by anyone for any soum in Mongolia. In order to refine and precise further the budget, users of the calculation tool can also replace some of the automatically-extrapolated estimations by accurate figures that match the actual situation of their soums.

BUDGET TABLES AND OTHER WORK HYPOTHESES

The expense table was built around two main types of costs: investments and running costs.

Investments essentially correspond to infrastructures (waste management facility and landfill) and equipment necessary for proper waste management at the soum level (trucks, bulldozer, glass shredder, plastic press, tools and sorting bins). The unit costs entered in the table are approximations corresponding to what was recently spent in Khishig-Undur or to rough prices collected on the Internet or from knowledgeable suppliers. For some budget lines (facility, landfill, machines...), quantities were set to 1 regardless of the size of the population. However, for expenses that are more directly linked with the number of households (e.g. number of sorting bins or waste management trucks and necessary staff), formulas were created to take into account the size of the population.⁷

In order to estimate an average yearly budget, each investment budget line was reported to an amortization period. Realistic estimations were arbitrarily chosen: 30 years for the waste management facility; 20 years for the sorting bins (made of metal); 10 years for the landfill (considering that, after this period, it would be full and a new alveole would have to be created); 10 years for the vehicles and machines; and 5 years for the basic tools.

⁶ Mongolian Statistical Information Service (www.1212.mn), figures for year 2021.

⁷ Necessary number of trucks was estimated to one per 200 soum-center households (rounded up). Number of household sorting bins was set to one per soum-center household (considering, based on our investigations reported in Ecosoum's [Waste management baseline study in Khishig-Undur soum](#) report (2021), that nomadic herder households don't need/want such heavy bins). Number of other bins (for streets and public institutions) was approximated to one per 15 soum-center households.

The second main category of expenses (running costs) were divided into four sub-categories. The first is related to maintenance (estimated to an average of 1 million MNT per infrastructure/equipment per year). The second sub-category is the necessary staff, which was estimated, for a soum the size of Khishig-Undur, to 3 full-time positions with 1 million super-gross monthly wage each.⁸ The third sub-category corresponds to the functioning expenses of the waste management facility (mainly electricity for machinery and heating in winter). The fourth sub-category includes all transportation-related expenses, both within the soum (for door-to-door collection⁹, for transportation from facility to landfill¹⁰, as well as for landfill bulldozer¹¹) and between the soum and other stakeholders situated outside (recycling industries and take-back for reusing by producers)¹².

Regarding the income table, three main sources were considered: public administrations' budgets; a dedicated local tax paid by soum population; and trading recyclables¹³.

Public administrations' budget includes both soum-level budget and contribution from aimag administration. In our example, both budget lines were set to 5 million MNT, which is an arbitrary (although relatively realistic) estimation.¹⁴

Direct financial contribution by the soum population is counted as a dedicated waste management local tax that is set up by the soum administration. In Khishig-Undur soum, the new tax to be implemented is 3,000 MNT per month per household, in addition to the tax paid by other waste producers such as private businesses and public institutions (10,000 MNT per month on average).¹⁵

The trade of "recyclables" was sub-divided into the main types of waste that are currently sellable either to recycling industries or to companies who accept to reuse their packaging (essentially glass

⁸ To enable extrapolation to other soums, a formula was created to budget one full-time staff per 130 soum-center households. This necessary personnel includes staff that should work in the waste management facility and/or the landfill as well as waste collectors (truck drivers). Necessary distribution of workforce for each type of tasks actually depends on the level of at-source sorting (more staff are needed in the facility if at-source sorting is mediocre, while more staff can be dedicated to door-to-door collection when waste producers properly sort their waste); however, the total number of necessary staff can be considered relatively stable once reported to the size of the population.

⁹ Work hypotheses for door-to-door collection are the following: one collection per month per household; one truck would be full after collecting from 10 households; one 10-households round-trip would correspond to 4 km; other above-mentioned parameters such as gas price are similarly applied here.

¹⁰ Work hypotheses for transportation from facility to landfill are the following: one round trip per week; 4 km per round-trip (arbitrarily established based on the current situation in Khishig-Undur).

¹¹ Work hypotheses for bulldozer usage are the following: used for moving and covering waste disposed in the landfill for 4 hours per week on average; gas consumption estimated to 18 liters per hour.

¹² Work hypotheses for recyclables' transportation to Ulaanbaatar are the following: price per ton is estimated by multiplying above-mentioned distance and fee per distance variables; yearly tonnage for each type of recyclables produced in the soum is estimated based on an extrapolation from baseline study results in Khishig-Undur soum (household average yearly production: 15kg of PET soda bottles, 3kg of beer PET bottles, 10kg of plastic bags and wrapping, 2 kg of other hard plastics, 2 kg of aluminum cans, 35 kg of glass bottles, 8kg of glass jars).

¹³ In this report, we use the word "recyclable" in a broad sense that also includes waste that are rather "reusable" or "downcyclable" waste.

¹⁴ These two parameters are difficult to evaluate because they can vary a lot from year to year and from soum to soum. Aimag administrations don't offer waste-related additional budget to each soum every year, but when they do the total amount can be significantly higher than 5 million MNT. Regarding soum budget, 5 million MNT approximately corresponds to the average yearly budget dedicated to waste management (from overall soum budget) over the past years in Khishig-Undur.

¹⁵ In our example, we used this amount of 3,000 MNT per household, knowing that some soums don't implement a dedicated tax while some others chose a higher amount. For our example, we used an average of 15,000 MNT per month for other taxpayers, with an estimated number of such taxpayers extrapolated from the size of the population (one per 10 soum-center household).

bottles and jars). These categories of waste are PET bottles (soda and beer), “soft” plastic bags and wrapping (LDPE), non-PET “hard” plastics (HDPE and PP); aluminum cans, glass bottles and glass jars. The prices applied in the calculation tool are the best prices we could find during the writing of this report (early May, 2022), but they can easily be updated in the tool's calculation parameters if different prices are applicable at a given time.¹⁶

APPLICATION AND LESSONS OF THE CALCULATION TOOL

EXAMPLE OF KHISHIG-UNDUR SOUM

Using the previously explained work hypotheses and variables, we could build, for Khishig-Undur soum, the expenses and incomes tables presented below.

We found that expected yearly waste management expenses in Khishig-Undur soum reach over 94 million MNT while optimistic prospects of incomes only add up to 74 million MNT (in the ideal – but not immediately realistic – scenario where all valuable ‘recyclables’ can be sold to urban industries).

Main expenses

CATEGORY OF EXPENSE	TYPE OF EXPENSE	BUDGET LINE	YEARLY COST
Main investments	Infrastructure	WM facility construction (fence, buildings, outside arrangements, etc.)	3 333 333 MNT
		Landfill construction (landscaping, fence, etc.)	5 000 000 MNT
	Equipment	WM trucks	8 000 000 MNT
		Landfill bulldozer	3 000 000 MNT
		Glass shredder	600 000 MNT
		Plastic press	600 000 MNT
		Other small equipment and tools	600 000 MNT
		Soum-center household waste sorting bins	4 950 000 MNT
		Other bins (public institutions, streets, etc.)	330 000 MNT
Yearly running costs	Maintenance of main investments	Maintenance of WM facility	1 000 000 MNT
		Maintenance of landfill	1 000 000 MNT
		Maintenance of WM trucks	2 000 000 MNT
		Maintenance of landfill bulldozer	1 000 000 MNT
		Maintenance of shredder and press	600 000 MNT
	Full-time staff	WM facility workers and waste collectors	36 000 000 MNT
	Electricity and heating	Electricity and heating of WM facility	3 600 000 MNT
	Transportation	Gas for waste collection to households within soum-center	1 039 104 MNT
		Gas for transporting ultimate waste from WM facility to landfill	141 696 MNT
		Gas for landfill bulldozer	12 752 640 MNT
		Transportation costs of recyclables to urban facilities (per ton)	8 892 000 MNT
	WASTE MANAGEMENT SYSTEM APP. TOTAL YEARLY COST:		

¹⁶ This parameter is very sensitive and relatively uncertain in this calculation tool (as in real-life) because: 1/purchasing prices are likely to evolve very fast (up or down) on the market; 2/ the total income from trading recyclables represents a large part of the total income (app. one third); 3/ the actual income that can be created by selling recyclables actually depends entirely on the extent and quality of at-source sorting by waste producers and on the good will of companies that accept to buy-back some of their products. The income calculated in the tool thus corresponds to the eventual best-case scenario where all households and other waste producers perfectly sort their waste, then entirely collected and sold to urban recyclers/reusers (who accept to buy 100% of their products back, which is not the case as of today). Therefore, a large part of this income is actually not available at the beginning, when the soum-level waste-management system is initially established - but only possible after years of hard work and improvement.

Main incomes

CATEGORY OF INCOME	SOURCE OF INCOME	COMMENT	YEARLY INCOME
Budget of public administration	Soum general budget	Realistic amount that can be taken from total yearly budget	5 000 000 MNT
	Aimag general budget	Average yearly aimag contribution to soum-level WM investments	5 000 000 MNT
Financial contribution of the people	WM household local tax	3,000 MNT per month per household	35 568 000 MNT
	Other WM taxpayers	15,000 MNT per month on average of other taxpayers (shops, etc.)	6 240 000 MNT
Trade of recyclables	Soda PET bottles	Quantity (kg) estimated based on baseline study and waste audit results Average glass bottle weight : 500g / Average price : 50 MNT per bottle Average glass jar weight : 300g / Average price : 30 MNT per jar	7 410 000 MNT
	Beer PET bottles		889 200 MNT
	LDPE plastic bags and wrapping		5 928 000 MNT
	HDPE and PP containers		1 383 200 MNT
	Aluminum cans		2 371 200 MNT
	Glass bottles		3 458 000 MNT
	Glass jars		790 400 MNT
WASTE MANAGEMENT SYSTEM APP. TOTAL YEARLY INCOME:			74 038 000 MNT

Therefore, according to our estimations, it appears that the average waste management budget balance in a soum such as Khishig-Undur shall be in deficit of over 20 million MNT per year. In these conditions, we can conclude with confidence that, in the current conditions, managing waste at the soum level cannot realistically reach of point of financial sustainability.

DISCUSSION OF THE RESULTS AND FINDINGS

At this point, it should be stressed that this estimation includes significant approximations and margins of errors. While some figures precisely reflect the reality of Khishig-Undur soum, others are rough approximations and/or arbitrary (although realistic) choices. For example, if we decide to extend the amortization period of the main investments (e.g. 50 years instead of 30 for the facility), average yearly costs are (slightly) decreased. It is also possible that the projected costs of investments that were not made yet (e.g. the new landfill) are overestimated (or underestimated), or could actually be reduced by coordinating expenses with other activities (e.g. landscaping the new landfill when adequate machinery is already present in the soum for other reasons). By similarly choosing more optimistic figures for most variables, the total projected expenses could probably be reduced by app. 10 million MNT.

Likewise, we can decide to increase the expected incomes to try and reduce the gap with the expenses. We can hope that public administrations will decide to provide more budget for waste management. We can also expect that a higher waste management tax can be implemented to raise more money. Hoping that the purchasing prices of recyclables will increase compared to the current situation also enables bringing more balance in the total budget.

Overall, we could decide to justify work hypotheses differently to reduce expenses and increase incomes so as to conclude that Khishig-Undur’s waste management system could in fact be financially balanced and sustainable.

However, it appears that, despite its undeniable uncertainties and approximations, the work hypotheses applied above are already relatively optimistic – especially considering that they reckon on stable purchasing prices and perfect sorting, collection and selling of all produced ‘recyclables’

by all waste producers.¹⁷ In fact, we could also have chosen credible figures that would have tended to increase even more the gap between expenses and incomes.

In the end, the unarguable learning from this budget calculation tool is that, under the current conditions, the risk of establishing financially unsustainable soum-level waste management systems seems very high.

Incidentally, if we start using the tool for other soums, calculations show that increasing the distance between soum and Ulaanbaatar tends to increase the gap between expenses and incomes. For example, all else being equal, if the distance to Ulaanbaatar doubles (from 300 to 600 km), the deficit is increased by almost 50% (from 20 to 29 million MNT). Increasing the population tends to have an opposite result, but the impact on the deficit is much less significant (doubling population reduces the deficit by 13%).

Overall, this means that even if we applied more optimistic choices to the work hypotheses and study variables, we would still end up with budgets in significant deficit for soums that are located further away from Ulaanbaatar than Khishig-Undur (which is the case for app. 80% of all soums). This worrying fact thus tends to confirm that soum-level waste management systems are unlikely to reach financial sustainability if no other source of funding/income is included.

CONCLUSIONS AND RECOMMENDATIONS

In other words, our budget calculation tool tends to confirm what we already highlighted in previous reports: large companies that produce most of our waste (through single-use products or packaging) must contribute to solving the problem. Without their involvement, waste management systems have no chance to be established in a sustainable manner.

These alarming conclusions call for several recommendations that, budget wise, shall lead to either decrease expenses or increase fundings:

- **Development of aimag-level adequate recycling plants.** Although the size of each soum cannot be intentionally decreased, the distance to recycling industries can be. In our work hypotheses, we consider that all valuable 'recyclables' are to be sent to Ulaanbaatar. However, if more significant recycling industries were to be developed at the aimag level, transpiration costs from all soums could be significantly decreased (for unchanged income, provided that similar purchasing prices are applied).¹⁸

¹⁷ Let's repeat that the assumption that all potentially reusable/recyclable waste can be sold is over-optimistic at this point not only because it would require all waste producers to perfectly sort their waste, but also because even if they did, some companies still refuse to purchase back some of their items (even in perfect condition). For example, APU (who produces app. two thirds of the glass waste found in Khishig-Undur) accepts to take back only 14 types of bottles out the 35 types of APU bottles found in Khishig-Undur during our brand audit (although it should be acknowledged that these 14 types account for app. 80% of all APU bottles found during our audit).

¹⁸ However, it is important to highlight that investments in recycling plants must not come in the way of the overall goal, which is to reduce waste production in the first place. Indeed, as stressed in our *Zero-Waste and Circular Economy* report, massively investing in recycling facilities can lead to justifying ever-increasing consumption and waste production, which would obviously be counter-productive. Therefore, development of aimag-level recycling plants should not be seen as the ultimate solution: it should be carefully planned and integrated in a larger plan involving first and foremost our other recommendations.

- **Better coordination at the aimag level.** When it comes to reusable waste (e.g. glass bottles), things are more complicated since most large companies are located in Ulaanbaatar and unlikely to set up factories in all aimags. However, better coordination at the aimag level could still reduce transportation costs: if soums were to centralize their reusable waste (glass bottles and jars) at the aimag level (before joint transportation to Ulaanbaatar is organized), total transportation costs would certainly be reduced.
- **Significant logistical and/or financial involvement of large companies.** In any case, the companies whose single-use products and packaging constitute most of our waste should play a central role in managing this waste (a role that would incidentally be facilitated if coordination at the aimag level was improved). The measures taken by these companies should be either financial (providing the necessary funding to soums and aimags so that waste management budget can be balanced) and/or logistical (for example, take upon themselves to transport ‘recyclables’ from soums to urban facilities to reduce the expenses for public administrations). How exactly companies must be involved should be discussed openly to identify the best possible solutions. The main Mongolian companies that should take action were identified in our *Who produces our waste?* report.
- **Alleviation of strict take-back rules to facilitate soum-level waste management processes.** The current strict rules under which companies sometimes accept to buy back some of their packaging lead soum-level actors to carry out unnecessarily time-consuming (thus costly) actions to make sure they will be accepted by the respective companies. Alleviating these rules and transferring part of the tasks to the companies themselves would enable reducing the workload at the soum-level, and thus the expenses – not to mention increasing the reusing/recycling rate.¹⁹
- **Change in production practices to reduce the waste production in the first place.** Last but not least, following the 3R principle, it is actually the overall reduction of waste production that should be encouraged first and foremost. This means that companies must reduce the amount of packaging that they currently use. When really necessary, packaging should be reusable and, whenever truly impossible, 100% recyclable (in today's Mongolia) materials should be used.²⁰

¹⁹ For example, companies usually take back only a few of their items (the list of concerned items being likely to evolve at any time), which leads soum-level waste workers to constantly wonder and check if each item will in fact be accepted or not at a given time. Similarly, the very strict level of condition in which items are bought back often leads soum-level actors to pay transportation to Ulaanbaatar for some items that will eventually not be purchased due to alleged too poor condition. Therefore, either soum-level actors lose even more money as they try to enable waste reusing, or they are reluctant to take any risk and throw away in dumpsites valuable items that could actually be reused or, at worst, recycled or downcycled. That is why companies should offer buy-back adequate terms for all of their products, regardless of the condition, and manage non-reusable items on their own.

²⁰ More detailed recommendations for better industrial practices are provided in above-mentioned *Zero Waste and Circular Economy* report.