



SUPPORT FOR FECAL SLUDGE MANAGEMENT FOR THE CITY OF NIAMEY

REPORT 1 – UPDATE OF PPP OPTIONS

FINAL VERSION

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ABBREVIATIONS

APD	Detailed design
ARMP	Public procurement contract regulation authority
AT	Technical assistance
BV	Fecal sludge
DAO	Invitation to tender file
DTAO	Standard invitation to tender file
CFA F m	Million CFAF
PAEMU	Urban water and sanitation project
PPP	Public-Private Partnership
PNCSS	Public non-collective sanitation service
RTBV	Fecal sludge treatment fee
SEEN	Société d'Exploitation des Eaux du Niger
STBV	Fecal sludge treatment station
WSP	Water and Sanitation Program

1. INTRODUCTION

The population of Niamey is growing at a sustained rate of around 4% per year, rising from around 1 million inhabitants in 2010 to nearly 1.5 million in 2020 and over 2 million in 2030. This forecast doubling of the population in 20 years will go hand-in-hand with expansion of the urban area and substantial infrastructure needs.

As regards water and sanitation, the needs will be considerable. Growth in the volumes of water used (80% of which it is considered would have to be sanitized) follows the same rate as that of the population, with needs which will more than double, from 24.8 million m³ billed in 2010 to an estimate of over 61 million m³ in 2030, or around 134,000 m³ of water a day to sanitize by 2030.

However, the sanitation situation is alarming at present. Since:

- there is no collection or treatment infrastructure, other than individual facilities built or installed with no minimum rules or standards to obey (many open pits, traditional latrines and sumps with very negative environmental and health effects),
- sludge collection is organized by private emptying operators of two different types:
 - o "mechanical emptying" operators with limited means and generally very run-down trucks (61% of trucks for commercial use are over 25 years old according to the survey conducted in 2015),
 - o a large number of "manual emptying" operators in the informal sector and working with practically no equipment and in very precarious conditions,
- once collected, the sludge is poured directly into quarries right in the center of the city or the inner suburbs, since there is no dedicated site, with a very negative environmental and public health impact,
- the independent sanitation sector is not organized and there is no coordination between operators. The City of Niamey to which jurisdiction falls does not exercise it very much (awareness-raising and activity monitoring/control roles in particular).

To cope with this situation, the World Bank has financed a fecal sludge treatment station (STBV in French), through the PEAMU, under construction at present. Through the WSP, the World Bank has also financed a study for the development of City of Niamey fecal sludge management services carried out by the EDE/ECOPSIS/G2C consortium and finalized in May 2015. It is planned to build other fecal sludge treatment stations over time to cover the city of Niamey's needs.

This report continues along the same lines of the previous study and supplements it.

A continuation along the same lines for all the strengths of the previous study which:

- made a detailed diagnosis of the sector position: a description of the legal and institutional framework, households' behavior and facilities based on a survey of households, an inventory of emptying firms with a detailed description of their activity, as well as an evaluation of the emptying firms' financial capabilities and households' ability/willingness to pay for the service. This diagnosis, validated by the stakeholders, seems very thorough and of high quality,

- made detailed recommendations for the organization of the fecal sludge sector, with an associated action plan to implement them. This action plan revolves around 5 areas for development covering the whole sector:
 - o Storage and access to emptying services,
 - o Fecal sludge collection and transport,
 - o Fecal sludge treatment and recycling,
 - o Laws/Regulation/Capability improvement and Communication,
 - o Financing mechanisms.

These recommendations have been validated by the stakeholders and do not raise any comments on review. They are a solid departure point and could be adjusted in the second phase of this study depending on the actions taken since 2015 and their results.

- proposed recommendations that are accepted by the stakeholders for access to the service for the most deprived population.

However, the present report has to provide additional information and improvements on certain other points and proposals which it is worth questioning, reviewing and adapting to take more account of local constraints. This mainly concerns the business plan which only covers four years and is based on the principle that operation of the STBV will be financed to a great extent by the recycling of fecal sludge by-products. However, given the volumes of sludge produced, the lack of knowledge of the market and the actual possibility of fecal sludge recycling, given its initial quality, this assumption seems unrealistic. Questioning this assumption leads to a radical change in how the service is financed and therefore the model itself chosen for PPP.

The purpose of this report is not therefore to redo what has already been done and that we consider good quality work, after the discussions we had with the stakeholders during the first mission. When necessary for the proper understanding of this report, we will repeat the key points of the diagnosis already performed and the recommendations we consider relevant.

This report proposes the necessary updates on the PPP options, depending on how the fecal sludge treatment service is financed. For this, it is divided into four parts:

- The first part cites the important points of the contract which explain the questioning of certain assumptions of the previous study's business plan and therefore the type of Contract proposed for operation of the STBV by a private operator,
- The second part on the legal framework for the financing of the fecal sludge treatment business, presenting the options of taxation or fees and their methods of application,
- The third part presenting the STBV business plan revised to take into account the uncertainties over the possibilities for developing the by-product market,
- Finally, the fourth part presenting the invitation to tender strategy, reviewed in the light of the necessary changes to be made to the PPP model and the implications for the invitation to tender procedure.

2. THE FECAL SLUDGE MARKET

The fecal sludge market was analyzed in detail in Report number 1 (Diagnosis) of the study for the development of City of Niamey fecal sludge management services, based on an inventory of emptying firms and trucks, the monitoring of some trucks to gain a proper understanding of their activity and the characteristics of the service and site visits (sludge discharging, garages, parking points, etc.). We use the data from this diagnosis to estimate fecal sludge market potential and its limits in the short term.

2.1 Household emptying

2.1.1 Volumes produced

The volume of sludge produced by households can be estimated from the specific production of sludge per person per year, which, according to various studies, ranges from 0.25 to 1.5 l/person¹ per day for Sahelian countries. Based on this data, the total quantity of sludge produced is given by the following formula:

$$Q = \frac{365 \times N \times Ps}{1000}$$

With:

Q: Total quantity of sludge in m³/year;

N: Total number of inhabitants not connected to a collective network and which have an independent sanitation facility;

Ps: Specific production of sludge in l/person/day.

With the population data², and specific production of 1.20 l of sludge per person per day³, the volume of sludge produced in Niamey goes from 556,734 m³/year to nearly double (916,000 m³/year) in the space of only 15 years.

Table1: Estimation of the volumes produced in Niamey

	2016	2020	2025	2030
Population	1,271,082	1,485,773	1,762,824	2,091,536
Annual volume fecal sludge (m ³ /year)	556,734	650,769	772,117	916,093
Estimated volumes treated by the Koumba STBV (m ³ /year)		86,112	129,168	129,168
Rate of the city of Niamey's fecal sludge treatment by the Koumba STBV		13.2%	16,7%	14,1%

Source: STBV – ICEA business plan

According to this data, the STBV's treatment capacity would only cover, at best, 16.7% of the sludge volumes produced by the city of Niamey.

¹ Sources: Heinss et al. 1998 For the town of Accra in Ghana.

² RPGH 2012 population data and annual population growth rate of 4% until 2020 and 3.5% thereafter for Niamey

³ Assumption used in the study for the development of City of Niamey fecal sludge management services

However, this is not the whole volume of sludge produced which could be taken to the STBV, but only the part dealt with by emptying trucks. Households using manual emptying will probably not take their sludge to the STBV, unless the number of STBVs increases sufficiently to drastically limit these transport costs.

The volume of sludge to consider here is therefore the volume of sludge emptied annually and transported by these trucks. The previous study made an inventory of trucks in Niamey and was able to identify 16 companies, with a total of 27 trucks.

Based on a truck utilization rate of 65% as shown by studies conducted in Dakar, the volume of the trucks, their daily turnaround rate and the number of working days estimated for each of them (from the survey conducted by the previous study), the calculation gives a daily sludge transportation volume of around 620 m³/day, or 226,300 m³/year in 2016, just under half the production estimated for the city.

This result can be compared with that of the household survey conducted during the previous study. According to this survey, only 43% of households in Niamey go in for mechanical emptying (using emptying trucks), for an annual volume of sludge transported of around 204,800 m³/year.

Thus, whatever approach is used to estimate the volumes of sludge which might end up being taken to the STBV, they are way beyond the station's maximum treatment capacity, estimated at 90% of its nominal capacity, or around 128,045 m³/year.

Given the city's size, taking sludge to the new STBV rather than discharging it in the surroundings, will represent a not insignificant cost for emptiers. At first, it is therefore reasonable to think that only emptiers operating in a certain area around the Koubia station will come to discharge, if they consider the station access rate acceptable. The previous study also used this approach, estimating the number of inhabitants in a radius of 6, 8 or 10km around the station and the corresponding sludge production.

Table2: Volume of sludge produced by inhabitants using mechanical emptying

	6 km	8 km	10 km
Total population (inhabs.)	285,281	563,434	770,267
Population using mechanical emptying (inhabs.)	183,986	340,374	465,692
Annual volume fecal sludge produced (m ³ /year)	80,586	149,084	203,973

Source: Development of City of Niamey fecal sludge services, Report no.3

It concludes that there are enough inhabitants using mechanical emptying in an 8km radius to have the STBV running at full capacity.

This means two things:

- The STBV should never have a problem of working at less than full capacity or being slack,
- It is urgent to plan for the financing of new stations to cover municipalities ("communes" in French) numbers 4 and 5. Still according to the previous report, a 10km radius around the future Koubia STBV covers all the communes of Niamey 1 and 2, virtually the whole of Niamey 3 (90.2%) and the majority of Niamey 5 (68.2%). Less than 10% of the territory of Niamey 4 is concerned.

2.1.2 Volumes of sludge entering the STBV

In order to estimate discharge products, we assume that the volumes of sludge entering the STBV each day (312 working days per year) amount to:

- 30% of the daily volumes that can be treated by the STBV (456 m3/day) in 2018, or 137 m3 of incoming sludge per day,
- 60% in 2020, or 274 m3 of incoming sludge per day,
- 90% in 2022, or 410 m3 of incoming sludge per day, maximum volume,

Table3: Volumes discharged at the STBV

	Unit	2018	2019	2020	2021	2022	Average 2023-27	Average 2028-32
% capacity of the STBV	%	30%	45%	60%	75%	90%	90%	90%
Volume discharged	m3/year	42,682	64,022	85,363	106,704	128,045	128,045	128,045

2.1.3 Pricing and business profitability of emptiers

As we already mentioned in the introduction, the emptying business in Niamey is carried on by two very different types of operator:

- The "mechanical emptying" operators: small private firms, owning one or more pumping or hydro-curing trucks, they generally employ personnel in charge of doing the emptying (drivers, carriers, apprentices or helpers), on a permanent or temporary basis,
- "Manual emptying" operators: these are most often individuals working informally, in return for payment. It should be noted that under the provisions of order number 93-13 of March 2, 1993 related to the public hygiene code and act number 98-56 of December 29, 1998 related to environmental management, the manual emptying business is neither authorized nor regulated.

In the absence of official arrangements for mechanical emptying firms, the prices charged by these operators are not regulated and are often the result of bargaining between the customer and emptier. The prices charged for the mechanical emptying service range from CFAF 7,000 to 30,000, with an average price of CFAF 20,000.

In theory, the cleaning out service offered to households by these operators should completely empty the contents of pits, i.e. waste water and sludge. Only hydro-curing trucks are able to pump liquid and solid matter out of the pits and therefore provide a comprehensive, high quality service. However, the full cleaning service is very rarely provided by mechanical emptying firms, for two reasons:

- Of the 27 emptying trucks in circulation in Niamey, 78% are pumping trucks, which are less expensive than hydro-curing trucks. These trucks are also less efficient and only pump liquid matter out of pits during emptying;
- The "hydro-curing" function of hydro-curing trucks is very rarely used during emptying with this type of truck. Pumping out sludge takes more fuel than pumping out water. Consequently, the price of full cleaning is higher for households that prefer to use manual emptiers when it is necessary. Thus, in most cases, the trucks are just no longer equipped for the cleaning out of solid matter.

Thus, in practice, full cleaning out of pits most of the time involves two types of operator. To obtain better quality of service, households first call on mechanical emptying firms to pump out water, then use manual emptiers to extract sludge from their pits. In this cases, households bear two costs, one for mechanical emptying and one for manual emptying.

The prices charged by manual emptiers range from CFAF 5,000 to 10,000, with an average price of CFAF 8,000.

In total, households therefore spend an average of CFAF 28,000 for complete emptying of their pits. However, according to the interviews conducted, this price corresponds more to the lowest price in the range of household spending (from CFAF 28,000 to CFAF 45,000) for this service.

The previous analysis of the ability and willingness to pay of households using mechanical emptying reveals the following points:

- Users' ability to pay is low: The incomes of 43% of households are at or below the poverty line (CFAF 131,000/year). In 79% of cases, the price paid does not exceed CFAF 21,000.
- It seems that a price below CFAF 7,001 only pays for "small emptying", that is one trip of a small truck (capacity of 6m³). This type of emptying is insufficient if the household pit is large. The prices charged for "full emptying" (using a larger capacity truck or several trips in a small truck) range from CFAF 14,001 and CFAF 21,000. As household income increases, "small emptying" declines in favor of "full emptying".
- For households, full emptying of their pit, the guarantee that their sludge is safely disposed of, away from all human contact, as well as increased supervision of disposal are criteria for improvement of the emptying service. Analysis of household willingness to pay shows that 77% of those using the mechanical emptying service are willing to pay an additional cost for an improved service. 37% of them would pay up to CFAF 5,000 maximum and 36% an amount ranging from CFAF 5,001 to CFAF 10,000.
- 92% of households are in favor of setting up an STBV. Considering the treatment of sludge as a service improvement criterion, 59% of households support passing a maximum of CFAF1,000 on to the cost of mechanical emptying.

The profitability of emptying firms depends essentially on their size, defined in terms of the number of trucks they own:

- Small-sized firms, with one truck,
- Medium-sized firms, with two trucks,
- Large firms, with at least three trucks.

The table below shows the reconstitution of an income statement of a mechanical emptying firm according to its size, as well as the rates of return achieved in current conditions (before the setting up of the Koubia STBV).

Table4: Returns of mechanical emptying firms according to their size before STBV

CFAF1000	Small-sized	Medium-sized	Large
REVENUES			
Emptying of pits	13,104	26,208	30,240
Other activities	-	1,310	19,440
TOTAL REVENUES	13,104	27,518	49,680
EXPENSES			
Personnel	2,652	5,304	8,856
Operating	7,341	14,682	21,969
<i>Including sludge discharge</i>	360	720	1,080
<i>Including fines/pollution</i>	936	1,872	1,872
Depreciation	784	1,567	2,471
Other (trading license, etc.)	175	350	1,077
TOTAL EXPENSES	10,952	21,903	34,373
Earnings	2,152	5,615	15,307
Returns	16%	20%	31%

Source: *Développement des services des BV dans la ville de Niamey, Rapport n°1 (Development of fecal sludge services in the city of Niamey, Report no.1)*

The three types of firm are profitable. However, only medium-sized and large firms reach a rate of returns above 20%, considered as the break-even point for this business. This can be explained by the fact that these two types of firm diversify their activities (fuel transport for example), while small emptying firms only empty household pits.

2.2 Fecal sludge discharging

2.2.1 Current discharging conditions

The fecal sludge discharging sites known to emptying firms in Niamey are:

- The sites of Koubia, Cité Caisse and Harobanda are authorized, although they are not equipped or organized. These are the best-known sites, with respective utilization rates of 81%, 63% and 31%. Only the Koubia site belongs to the commune of Niamey. The sites of Cité Caisse and Harobanda are on land belonging to private landlords.
- The airport site is not authorized and completely closed to emptying firms. Nevertheless, 6% of them use it.
- The discharging quarries located around the outskirts of the city are not authorized, but are still used by 13% of emptying firms.

In principle, discharging at the Koubia site costs emptying firms CFAF500 per truck per round trip. A municipal officer must be present on the site to take payment of this amount. However, during the site visit by the Consultant, there was no officer present and the emptiers interviewed during the mission said that in general they discharged free of charge on this site.

In theory, discharging on sites belonging to private landlords (including quarries) costs emptiers CFAF1,000 per truck per round trip.

On average, according to the reconstitution of their operating accounts⁴, emptiers pay an average of CFAF385/truck for each discharge.

The sanctions applied by police officers, the gendarmerie and the environmental police (forestry and water) are fines for unauthorized discharging, but also for nuisances caused during the transport of fecal sludge. They are particularly high, representing up to 13% of small and medium-sized firms' operating expenses:

Table5: Sanctions on mechanical emptying firms

CFAF	Small-sized	Medium-sized	Large
Annual sanctions	936,000	1,872,000	1,872,000
% of operating expenses	13%	13%	9%
Daily sanctions	3,000	6,000	6,000

Source: Développement des services de gestion des boues de vidanges dans la ville de Niamey – Rapport n°1 – May 2015; ICEA calculations

2.2.2 Discharging fee and emptiers' ability/willingness to pay

To finance part of Koubia STBV's operation, emptiers that will be using the station to discharge sludge will be subject to a discharging fee.

Since certain current discharging alternatives are virtually free, it is likely that the STBV operator will not be able to charge station customers (emptiers) a high fee for discharging sludge. This fee should remain at a moderate level in order to encourage emptiers to use the STBV as a place for discharging and limit the impact of this fee on emptiers' business returns and/or the cost of emptying for households.

A fee of CFAF300 per m3 of sludge discharged seems to be a ceiling. This fee would represent a cost of around CFAF2400/truck (for a truck of 8 m3), or over CFAF2000/truck more than the current cost (CFAF385/truck on average). Half of this additional cost could be passed on to the emptying price charged to households, up to the limit of their willingness to pay identified in the previously conducted willingness to pay survey (an additional CFAF1000 for each emptying in return for an STBV). The other half would be absorbed by emptying firms' margins.

However, in order to encourage people to use the STBV, a small cost of CFAF100 per m3 of sludge discharged could be envisaged in the years immediately following the station's commissioning. This amount could more easily be passed on to the emptying price paid by households and would therefore not significantly affect emptiers' profitability:

- This cost is already partly borne by emptiers which today pay around CFAF48 per m3 of sludge discharged (according to the reconstitution of these companies' operating accounts from the diagnosis report);
- It is possible to pass on the additional cost per m3 of sludge emptied (CFAF52) to the emptying price paid by households. Based on an average emptying volume of 8m3, the total additional cost for each emptying is CFAF415, which is still below the additional amounts that households are willing to pay in return for the commissioning of the STBV (i.e. CFAF1,000).

⁴ Développement des services de gestion des boues de vidanges dans la ville de Niamey – Rapport n°1 – May 2015

Later on, this discharging fee could be increased to CFAF200/m³ over the period 2023-2027 and to CFAF300/m³ over the period 2028-2032.

Table6: Discharging fee proposal

CFAF/m ³	2018-22	2023-27	2028-32
Discharging fee	100	200	300

The following table illustrates the effect of the introduction of such a fee on the profitability of mechanical emptying firms, according to size.

Table7: Profitability of mechanical emptying firms according to size with Koubia STBV

	Small-sized	Medium-sized	Large
Number of trucks	1	2	3
Number of round trips per day per truck	3	3	3
Amount of the discharging fee per trip by a truck (average 8m ³) ⁵	800	800	800
Total amount of the discharging fee per day (CFAF)	2,400	4,800	7,200
Total amount of the discharging fee per year (CFAF)⁶	748,800	1,497,600	2,246,400
Cost related to discharging borne by emptiers before STBV per year (CFAF)	360,000	720,000	1,080,000
Additional cost to factor in per year (CFAF)	388,800	777,600	1,166,400
Additional cost to factor in per day (CFAF)	1,246	2,492	3,738
Additional cost per truck trip (average 8m³) with STBV (CFAF)	415	415	415
Returns with STBV	13%	18%	28%

Source: Développement des services de gestion des boues de vidanges dans la ville de Niamey – Rapport n°1; ICEA calculations

The discharging cost at present borne by emptiers (CFAF385/m³ on average) corresponds to these firms' willingness to pay, used in calculating their returns under current conditions, without the STBV (table 4).

The additional cost for the introduction of a discharging fee is around CFAF415 per trip of a truck going to discharge at the STBV.

The first assumption is that this additional cost is entirely borne by the emptying firms. This means that the firms do not enter an increase in emptying revenues (passed on to the emptying price), nor a decrease in expenses (drop in fines for unauthorized discharge).

Under this assumption, the emptying business remains profitable, although at levels below the 20% threshold for small and medium-sized firms (table 6). Firms therefore have the financial ability to pay for the sludge volumes discharged at the STBV per m³.

⁵ According to the previous study, the average capacity of emptying trucks at present registered is 8m³

⁶ 312 days worked per year (6 days per week)

The second assumption is that the rise in the cost of discharging is passed on to the emptying price paid by households. This would leave firms' profitability unaffected and therefore maximize utilization rates of the STBV.

Under this assumption, where the additional cost generated by the discharging fee is entirely borne by households:

- The effect on the emptying price would remain low for households: An additional CFAF415 to bear either by one household only for the emptying of a large pit of 8m³ (around CFAF50 per m³ of cleaned sludge), or by two households in the case of small pits (around CFAF25 per m³ of cleaned sludge). In either case, this remains well below the maximum additional amount that households would be willing to pay to have an STBV set up (CFAF1,000).
- Emptying firms' profitability is not affected compared with the current situation (no STBV).

Although an increase in utilization of the STBV should in theory reduce the amount paid in sanctions by emptiers (no more unauthorized discharging) and therefore increases their profitability, it is not appropriate to formulate an assumption on this. It is difficult to distinguish fines for unauthorized discharging from those emptiers receive on a daily basis while transporting sludge.

In conclusion, the increase in discharging expenses for emptiers related to the introduction of a discharging fee could be borne by households by passing it on to the mechanical emptying price. This average additional cost (CFAF415 for 8m³ of cleaned sludge) is affordable for households since it is below the price identified in the previously conducted willingness to pay survey (an additional CFAF1000 for each emptying in return for an STBV). There is thus the possibility of increasing emptying prices to include the cost related to the introduction of a sludge discharging fee. Under this assumption, utilization of the STBV by mechanical emptying firms would not affect their profitability.

2.3 Fecal sludge recycling

2.3.1 The quality of fecal sludge

The dimensions of Niamey STBV have been calculated on the basis a sludge quality benchmark in similar contexts and environments (Senegal, Burkina Faso and Ghana). No studies of Niamey sludge quality have been performed for its design and dimension calculation.

However, the quality of the sludge entering the station will depend on a number of elements, namely:

- The use of latrines by households,
- The type of latrine (traditional, single or twin pit, etc.),
- The capacity of emptying trucks to absorb all the contents of the pit (including the thickest sludge and the solid waste it sometimes contains), or just liquid matter.

Regarding the use of latrines by households, current practices lead to the presence of hydrocarbons or chemicals used for disinfecting, polluting cleaning products (absence of separate pits), solid household waste (inappropriate household habits), etc. Consequently, the quality of sludge entering the STBV would only be suitable for recycling for agricultural purposes without danger if households are made aware of how to use latrines and pits properly and emptiers of the

importance of the quality of the contents of pits to be emptied and if on-site sanitation facilities (OSSF) are brought up to standard over time.

Thus, without reliable data on the quality of incoming sludge, it is difficult to predict the quality of the sludge which will come out of the station and therefore to assess its potential for recycling for commercial purposes, particularly agricultural. Although spreading sludge on market garden and agricultural crops noticeably improves yield quality, the health risk is considerable if the sludge is not perfectly stabilized and sterilized.

The different treatment stages planned for the STBV should reduce the concentration of heavy metals in the sludge, but not treat other elements. These stages are essential for obtaining dried, stabilized sludge, potentially reusable for farming:

1. Pretreatment, which should:
 - a. Remove the solid waste in sludge, gravel and sand (*trash removal/sand removal*);
 - b. The separation of liquid material (which will be taken to planted filter drying beds to clean water before releasing it into the Koubia site quarries) from solid sludge which will then be pumped to non-planted drying beds. The aim of this stage is to reduce, if possible, the quantity of sludge to pump to the drying beds (*sedimentation*).
2. Drying of sludge deposited on non-planted drying beds, which is enough to stabilize it in dry periods. In wet periods, drying time has to be extended: sludge is removed from non-planted drying beds to a storage shed to ensure that it is completely sterilized.

When the STBV is started up and in the early years of operation, there will be little visibility over the real possibilities of fecal sludge recycling due to uncertainty over its quality before, and therefore, after treatment. Therefore, as part of the business plan review, it is proposed to stipulate short contracts, for 5 years, allowing financing methods to be altered depending on the possible development of a fecal sludge market.

Thus, during the first 5 years, it seems reasonable to emphasize the development of recycling, beginning with the monitoring of sludge quality. This will be done by creating and providing regular input to an exhaustive, reliable data base on incoming and outgoing sludge volumes and its quality before and after treatment. This information, unavailable today, is essential for determining if the sludge will be resalable and recyclable without danger for the public. On this basis, it will then be possible to redefine by-product sales (stabilized sludge or compost made from the sludge), on the basis of real, reliable data, with a view to renewing the contract in 2023.

In this approach, the operator's remuneration over the first 5 years does not take into account any revenues from the sale of by-products, if the operator should manage to develop this market. These revenues will revert entirely to the operator, in return for their efforts to prepare and sell a by-product compliant with international quality standards.

2.3.2 The by-product market

Potential takers for by-products are market gardeners and farmers, who are willing to use compost made from fecal sludge. According to the previous study, 74.2% of them are willing to spend a maximum of CFAF1,000 to buy a 50kg bag of fertilizer (compost), that is CFAF20,000 per tonne of compost.

No attempt at composting fecal sludge has been reported in Niger. The only experience of composting is that of the Nigerian association ASE which at present manufactures compost next to the Koubia STBV site and markets it. This compost is made from droppings, manure and organic matter from household waste recovered at the Koubia site, which are mixed with water hyacinths from the Niger river. With its experience, ASE could be an intermediary between the STBV and farmers, and thus be a potential customer for the STBV for the purchase of stabilized sludge, in order to make compost.

Moreover, 80% of farmers and market gardeners interviewed in the previous study stated that they had used the sludge emptied by the emptying trucks directly on their crops and noted an improved yield. However, as explained above, there is a very great health risk in spreading non-treated or badly treated sludge on crops for human consumption which cannot be ignored under any circumstances. Thus, the purchase of dried, stabilized sludge from the STBV for spreading on crops will depend entirely on the quality of this sludge, and is therefore only hypothetical at this stage. It is up to the operator to succeed in treating this sludge in such a way that it can either be sold directly or processed into compost before being sold on.

2.4 Regulations applicable to the STBV

In the light of its activity and characteristic, the Koubia STBV should be subject to act 66-033 of 24 May 1966 on dangerous, unhealthy or troublesome establishments⁷. At this stage, we are not aware of authorizations which might have been issued for operation of the STBV.

However, according to act 66-033 of 24 May 1966, dangerous establishments are divided into three classes depending on their size and the risks they entail for the environment or public health. Each class is subject to a specific authorization or declaration procedure with varying degrees of constraint. Establishments in the 1st and 2nd class cannot open without an authorization from the administrative authority. Those in the 3rd class must send in a written declaration to the administrative authority before they open⁸.

Decree no. 76-129 of 31 July 1976 sets out the information and supporting documents for authorization applications and declarations, as well as the procedures for obtaining authorizations and proof of submission of declarations⁹.

This decree also stipulates the procedure for performing an enquiry which should be carried out if necessary for the operation of such an establishment.

The nomenclature of classified establishments is appended to this decree. It sets out the nuisances represented by each type of classified establishment and the class it comes under (1st, 2nd or 3rd class).

⁷ See also order nos. 76-21 of 31 July 1976 and nos. 79-45 of 27 December 1979 in application of act 66-033 of 24 May 1976.

⁸ See Order no. 014 MMH/MDR/MI/ MTP/T/U/MAECI of 01/11/1976 setting out the general requirements to which dangerous, unhealthy or incommodious establishments of the 3rd class are subject.

⁹ See Decree no.76-129/PCMS/MMH of 31 July 1976 setting out the application conditions for act 66-033 of 24 May 1966 on dangerous, unhealthy or bothersome establishments.

It should also be noted that a ministerial order sets out the methods of administrative monitoring of these establishments¹⁰.

In this case, the class to which the Koubia STBV belongs should therefore be determined as per the above-mentioned 1966 act to determine the administrative procedure for obtaining the authorization or proof of declaration required for its operation.

At this stage, given the Nomenclature of dangerous, unhealthy or troublesome establishments listed in the above-mentioned Decree no. 76-129 of 31 July 1976, the STBV should be listed in any case in the 1st or 2nd class and will therefore be subject to an authorization (see Act of 24 May 1966, article 4). However, it remains difficult to be more specific as to the exact category the STBV belongs to.

The nomenclature has had to be modified since 1976 (as the French equivalent is modified, on a very regular basis, to adapt to regulatory and technological innovation requirements). However, at present, we only have the 1976 version and it is highly likely that the current version has new headings for waste treatment plants which are a particularly regulated source of nuisances.

Nevertheless, several headings contained in the 1976 version are close, either by activity or by type of nuisance, to the STBV's activity. Even if it is likely that the STBV belongs to a specific heading, the headings mentioned below are relevant insofar as they illustrate the system applicable to activities of the same order:

- B05 - Depositing of sludge and trash, highways, soot pulverulent waste whatever they are destined for - No threshold - (1st class).
- D02 - Depositing of household waste 1) by fermentation in controlled dumps (Class 2), and 2) in all other cases (1st class).
- E03 - Depositing of fertilizers containing organic matter, not being the annex of a farm, when they contain drainage matter and animal matter, in a desiccated state, without a threshold value (1st class) (Note: It is the type of establishment that comes closest to the STBV's activity apart from the aspect concerning the presence of animal matter).

The three establishments with activities close to those of the STBV are classified as 1st class. It is, therefore highly probable that an operating license will be necessary for the STBV's activity. Ultimately, it will be up to the ministry for mining and hydraulics to determine what class the STBV should belong to.

However, whatever system is applicable, operation of the station will be subject to compliance with technical requirements in terms of the types of waste allowed, its method of treatment and the properties of the matter and effluents resulting from operation of the station. These standards will appear in the license to operate (whatever its form) issued to the operator.

In general, the technical specifications impose the general standards applicable in the area under consideration¹¹. However, working on the assumption of an activity which is conducted in a high-risk human or environmental milieu, the relevant administrative authority always has the possibility of setting standards which may be more stringent. At this stage, the following comments should be made on this legal framework:

- Firstly, assuming the applicable system requires an impact study and public inquiry, there is every reason to start the licensing procedure as soon as possible in order to get an ad hoc license at the earliest possibility and avoid delay in implementing the project.

¹⁰ See Order No. 0027/MMH of 9 October 1979 regulating the inspection and monitoring of dangerous, unhealthy or troublesome establishments (E.D.I.I.).

¹¹ See, for example, order no.140/MSP/LCE/DGSP/DS/DH of 27 September 2004 setting the standards for discharge of waste in the natural milieu.

- Secondly, the operating license application should be submitted by City of Niamey, given that a declaration of change of operator (or an application for authorization to change operators, depending on the system applicable) should be submitted as soon as the Koubia STBV operation service contract holder is known.
- Finally, the technical requirements (e.g. quality of sludge, quality of effluents, methods of preventing pollution, etc.) contained in the operating license will form the basis of the operator's obligations. Contractually, it will be up to City of Niamey to ensure that the contract holder (i) actually has the license in question and (ii) that they comply with the terms. As a matter of principle, the technical specifications appended to the Koubia STBV operating contract cannot be technically less stringent than the operating license. On the other hand, they can always be more rigorous in certain areas depending on City of Niamey's requirements.

3. FINANCING OF FECAL SLUDGE TREATMENT

3.1 Review of the existing legal framework, taxes and fees and their application

3.1.1 Principles

The law in Niger concerning sanitation obligations and therefore the financing of public authorities' obligations in this area through taxes and fees is as follows:

- Firstly, the obligation to eliminate excreta and other similar waste (i.e. fecal sludge) over their territory is devolved to decentralized authorities, in conjunction with the public or private services responsible for hygiene and sanitation.

This principle is enshrined in act number 98-56 of 20 December 1998, referred to as the environment framework act (art. 64). It is repeated identically in order no. 93-13 of 2 March 1993 instituting a public health code (art. 8).

- Secondly, in terms of tax resources, order no. 2010-54 of 17 September 2010 forming the general regional authority code of the Republic of the Niger stipulates that regional authorities have control over the "government taxation" granted to them, as well as their so-called "own" taxation¹².

This order stipulates that the resources of regional authorities also consist of "non-tax" resources which are revenues classified by nature, irregular sources of funds and other income¹³.

3.1.2 Government taxation

It should be pointed out that, as regards government taxation, the finance act determines government taxes levied on the territory of the communes (or regions) which are wholly or partially retroceded to these authorities¹⁴.

Within the limits and conditions determined by the finance act, the government retrocedes all or part of the taxes and user fees levied on the authority's territory.¹⁵

Finally, the municipal council can add a proportional tax to government taxes. The list of these taxes and the maximum rate are also determined by the finance act.¹⁶

However, in this case, the system should not be financed by government taxes but by City of Niamey's resources.

¹² See Order no.2010-54 of 17 September 2010, art. 224.1.

¹³ *Ibid* art. 224.2.

¹⁴ *Ibid* art. 228.

¹⁵ *Ibid* art. 229.

¹⁶ *Ibid* art. 230.

3.1.3 Local or "own" taxation

In terms of their own taxation, regional authorities do not have complete liberty.

The above-mentioned order states that the act defines the matters which can attract regional authorities' own taxes and that the finance act also sets their maximum rates.

Subject to these reservations, the municipal¹⁷ council can therefore create any tax¹⁸.

In addition, the municipal council can create user fees "*remunerating the service provided by the commune, for the personal and exclusive benefit of tax payers*" (of the commune)¹⁹. The order specifies that the service in question can be mandatory or optional.

The order draws up a restrictive list of the communes' fiscal resources: direct taxes, indirect local taxes and existing user fees²⁰.

So-called "non-fiscal" resources should also be added to regional authorities' resources, consisting of:

- revenues classified by nature;
- other income;
- irregular resources²¹;

Of these non-fiscal resources, revenues classified by nature consist of:

- operating income from land and holdings;
- investment income;
- income from the disposal of land assets and holdings;
- fees²².

We consider that the legal basis for the institution of the fecal sludge treatment fee as well as the **discharging fee** by City of Niamey, envisaged below to finance the service and remunerate the STBV operator can be identified in this "non-fiscal" category of "revenues classified by nature" (see 3.1.4.3 (i) and (ii) below)²³.

3.1.4 Financing of sanitation by local taxation

3.1.1.1 Present situation

We understand that a hygiene tax was levied on all operators and banks (excluding households) from 2000 to 2011.

¹⁷ By application of order no. 2010-55 of 17 September 2010 giving communes special status or town status and order no.2010-56 of 17 September 2010 making the urban communities of Niamey, Maradi, Tahoua and Zinder communes with special status or towns and the communes forming them districts ("arrondissements" in French), the Niamey municipal council is referred to as "Town Council". However, it has the full jurisdiction referred to in order no. 2010-54 of 17 September 2010.

¹⁸ See Above-mentioned order no. 2010-54, art. 30.6 (2nd and 3rd bullet points) and art. 227.

¹⁹ *Ibid* art. 231.

²⁰ *Ibid* art. 232.

²¹ *Ibid* art. 235 and art. 240.

²² *Ibid* art. 236 and detail in article 240 A concerning communes.

²³ *Ibid* art. 30.6 (4th bullet point). The municipal council deliberates in the following areas (...) 6. Administrative and financial management of the commune: (...) Institution of fees on services provided by the commune. (...)."

In 2007, the amount ranged from CFAF9,000 to CFAF360,000. The actions implemented by City of Niamey in return for this tax are not clearly identified.

We also understand that since 2011, three different taxes have replaced the health tax: a tax on dangerous, unhealthy or troublesome establishments, a tax on hydrocarbon pumps and hydrocarbon package depositing and a tax on the operation of grain mills. The income from them is reported to be around CFAF100m (collection of 94.3%) as at 31/10/2016.

In this respect, a local bylaw (a 2014 document) proves the existence of these three taxes out of a total of 39 different taxes and other income at present collected by City of Niamey for the municipal budget²⁴. To sum up, it seems that these 39 forms of taxation can be linked to the following categories:

- Local direct taxes (art. 232 Aa): 17
- Local indirect taxes (art. 232 B): 8
- User fees (art. 232 C): 10
- Income (art. 240 A) : 2
- Other income (art. 240 B): 2

The three taxes in question belong to the category of local direct taxes²⁵. Their respective amounts would be as follows:

	<i>Nature of the tax</i>	<i>Amount</i>
8	Tax on dangerous, unhealthy or troublesome establishments - Garages, service stations and similar establishments - Factories, tanneries, dyeing plants, cement plants and other	CFAF500/day CFAF1,000/day
12	Tax on hydrocarbon pumps and discharging of hydrocarbon packages - fixed plant mounted on an underground tank - mobile plant	CFAF35,000/pump/year CFAF15,000/pump/year
17	Tax on operation of grain mills	CFAF15,000/year

In the absence of detailed data, it is not possible to determine if, and to what extent, the revenue generated by the levying of these three taxes by City of Niamey could contribute to the financing of the fecal sludge treatment service and at what level.

Given City of Niamey's financial difficulties, it would be advisable to examine the ways of creating and collecting one or more new taxes earmarked exclusively for financing fecal sludge treatment.

3.1.1.2 Creation of ad hoc fiscal and non-fiscal resources for financing the fecal sludge treatment service

As stated above, article 232 of order no. 2010-54 quoted above lists the direct taxes specific to the commune (Aa), local indirect taxes (B) and user fees (C). Articles 236 and 240 refer to resources which include operating income from land and holdings and fees.

In this case, the category or categories which could be chosen and used to finance the fecal sludge treatment service should be identified from among the categories of resource already provided for in law.

²⁴ See Order no. (...) /M/PCVN/SG of (...) 2014 setting the amounts of the taxes to be received for the City of Niamey budget (document not signed and not dated).

²⁵ See order no. 2010-54, art. 232 A points 8, 12 and 17 respectively.

With a view to implementing the project within the planned timescale, it is preferable to link any new fiscal or non-fiscal resource to be created by City of Niamey to a category of levy already provided for in law. Thus, in terms of procedure, involvement of the legislator would not be necessary and a municipal order should be enough.

Failing which, it might be necessary to pass a new legislative text, as well as a finance act to set the maximum rate of the tax in question. This could lead to a timescale incompatible with implementation of the system as stipulated in the invitation to tender.

In the first analysis, given the categories stipulated by above-quoted order no.2010-54, none of the commune's direct taxes, and no local indirect tax could be used to finance the fecal sludge treatment service.

For user fees - article 232 (C) -, the "income from transfer of environmental services" category (point 9), could correspond to the compensation payable by commune tax-payers for the environmental services provided by the commune.

However, while it seems that this generic description could apply to the financing of a fecal sludge treatment service which does have the purpose of environmental protection (including the protection of public health), we are still doubtful in the first instance about the legislator's intention regarding this heading.

Under these conditions, it seems preferable to use the "resources" category which includes "operating income of land and holdings" and "fees" (articles 236 and 240 Aa) to set the "fees" for financing sanitation, specifically the operation of the Koubia STBV.

Incidentally, it should be mentioned that the introduction of one or more police fines could be envisaged. Their income could finance part of the service and they would be similar to the "tax for non-payment of parking fees" existing today²⁶.

This tax comes under "other income" appertaining to "non-fiscal" resources of the communes. Other income includes "all or part of the income and police fines handed out for the offences and violations committed on the territory of the commune »²⁷.

In this case, a system of police fines, for example for illegal discharge of sludge in the environment (outside the STBV), could be envisaged through a municipal order and income from it also earmarked for funding the service. (See 3.2.1 below)

3.1.1.3 Recommended solution

In the light of this, it will therefore be proposed at this stage to create the two "fees" mentioned in 3.1.3 above: (i) a fecal sludge treatment fee and (ii) a discharging fee. It will be remembered that a fee usually refers to "une taxe ou une somme due en contrepartie de la fourniture d'un service public" (a tax or sum due in return for the supply of a public service)²⁸.

- (i) We consider that a **fecal sludge treatment fee** could therefore come under the "fees" category referred to in article 236 of order no.2010-54 of 17 September 2010 mentioned above.

Its purpose would be to contribute to the financing of the fecal sludge treatment service, essentially by paying for: the station operator's remuneration, major repairs, possibly renovation in the long term and City of Niamey's operation oversight services (function of client).

²⁶ See 2014 order quoted above, heading no.38.

²⁷ See Order no. 2010-54 quoted above, art. 240 (B) point 1.

²⁸ See Gérard Cornu, *Vocabulaire Juridique*, PUF, 11th Edition, January 2016, p. 870.

The income from this fee would therefore be earmarked for the commune sanitation budget, part of it being allocated to the Koubia operation contract holder as remuneration for the service provided.

This fee would be paid by potable water service users in Niamey in return for the development and implementation of City of Niamey's sanitation service (see 3.2.2 below).

Regarding collection of this fee, it is envisaged that it should be done by Société d'Exploitation des Eaux du Niger (SEEN) under the conditions set out in the tripartite leasing contract signed on 20 March 2001 between the Republic of the Niger, Société de Patrimoine des Eaux du Niger and SEEN. This contract in fact provided for a system for such collection.

In article 13.8, this contract stipulates that:

the lessor is required to transfer to (...) to the public sanitation service operator the sums invoiced and collected for their account. The lessor's remuneration for collection of sums for the future sanitation company will be reviewed when the company is formed.

In article 64.3, this contract stipulates in addition that:

the lessor [Editor's note: SEEN] will finally invoice, if applicable, water sanitation service users for this service on behalf of the company operating the service. The conditions for this service are set out under a Contract to be signed between the lessor and the sanitation service operator. (Editor's note: our underlining)

In article 72, this contract then specifies that:

where applicable, the lessor shall collect on behalf of the sanitation service operator the sums the latter has invoiced to users of this service as per the stipulations of article 64.3 above.

The sums actually collected shall be transferred to the sanitation service operator at the latest on the fifteenth (15th) of the month following that during which they were received.

The lessor and the sanitation public service operator shall agree together on how this article shall be performed.

The following comments should be made on these stipulations:

The way they are written compels SEEN to assume, in principle, that there is such a collection, independently of whether or not a company in charge of sanitation exists at the time the contract is signed (2001).

These stipulations also compel SEEN to transfer the income from this collection to the company in charge of sanitation (article 13.8). By "company in charge of sanitation" City of Niamey should be understood, in the absence, under present conditions, of a lease contract for this service with a dedicated company in charge of sanitation.

Finally, while the contract does make stipulations for the future, it only makes this obligation effective for SEEN when an agreement is signed between SEEN and the service operator setting out the terms and conditions for remuneration of SEEN for this "service" and for transfer of the sums to the operator (articles 64.3 and 72).

In the case in point, the operator responsible for the service is City of Niamey, through an operating contract with a private operator. It will thus be up to City of Niamey to agree with SEEN on the payments to be made from the collection of this fee through a contract for the collection/transfer of the fee:

- (i) arrangements for the collection of this fee by SEEN;
 - (ii) remuneration of SEEN for the collection service provided;
 - (iii) arrangements for the transfer by SEEN to the Koubia STBV operating contract holder of the fraction of the fee providing part of its remuneration;
 - (iv) arrangements for the transfer of the remainder of fee income to City of Niamey's budget for its sector oversight mission and the development of the public non-collective sanitation service (PNCSS).
- (ii) In our opinion, the **discharging fee** could also come under City of Niamey's "non-fiscal" resources category in the sense of article 236, as "income" under "operation of land assets and holdings", or as a "fee".

The discharging fee is both an operating revenue of Koubia STBV which is an appurtenance of City of Niamey's public land, as well as a "fee for a service provided". Therefore, in legal terms, linking it to one of these two types of "resource" seems justified.

In the event of the Koubia STBV being operated directly by City of Niamey, this fee would remunerate City of Niamey for the service provided. In the present case, however, it will remunerate the service provided, not by City of Niamey, but by the station operation contract holder.

At the end of the procedure to appoint the STBV operation contract holder, depending on the financial bids proposed by the contract holder and chosen by City of Niamey, the amount of this fee will be decided upon by City of Niamey. It will be binding on the contract holder in their relations with users (mechanical emptying firms). This fee will correspond in practice to a public rate for sludge treatment in the STBV.

Formally, City of Niamey should therefore authorize the collection of this fee by the STBV operation contract holder, in remuneration for the service it provides. The discharging fee will be paid by emptiers to the company when bringing sludge to the STBV. (See 3.2.1 below.)

In both cases, it should finally be possible to create these "fees" by municipal order, without legislative intervention.

3.2 Application arrangements:

3.2.1 Discharging fee

STBV expenses will be partly financed by a discharging fee paid by emptiers each time they discharge at the station. It depends on the quantities of fecal sludge unloaded, by measurement of the actual volume (m³).

For mechanical emptiers to actually use the discharging station, instead of discharging in the open, there is a strong need for a communication campaign for them to agree to pay for:

- The cost of additional transport to the STBV (for some of them),
- The new fecal sludge treatment service, although this service is provided not for emptiers but for the authority.

In the early years, a low fee should be an incentive for emptiers to use the STBV.

In addition, illegal discharging on unauthorized sites should be heavily sanctioned to encourage emptiers to use the STBV. It will therefore be necessary to increase control of emptying firms around these sites as soon as the STBV goes into operation²⁹ on the basis of existing texts.

3.2.2 Fecal sludge treatment fee

The fecal sludge treatment fee shall be paid by potable water service users in Niamey in return for the development of the sanitation service at town level.

This fee, which depends on the volumes of water used, will be collected by SEEN on private water user invoices in Niamey. The advantage of having a wide assessment basis (all the volumes of water used by private users of the sanitation center) is that the fee can be set at a relatively low level.

The fecal sludge treatment fee is designed to finance, in order of priority:

- The cost of collecting this fee by SEEN (financial margin),
- Remuneration of the STBV operator, covering the other part of its expenses and ensuring a minimum level of remuneration for it,
- The operating fee paid to City of Niamey, as well as the costs of operator and emptying firm oversight by City of Niamey,
- The provision for STBV hydro-mechanical equipment renewal.

The rest, which will partly depend on the remuneration requested by the future operator in their bid, will revert to City of Niamey. It will be earmarked for the development of PNCSS³⁰, in particular for communication and awareness-raising campaigns with households which will be necessary for them to accept this new pricing system and new management practices for their independent sanitation facilities.

The introduction of this fee should not be associated with an increase in the water bill, but rather with the remuneration of a new sludge and waste water treatment service in a dedicated treatment station which will improve health conditions in the city.

²⁹ See Order no.2010-54 of 17 September 2010, art. 81 (9th bullet point) on the mayor's powers concerning the prevention and suppression of environmental infringements. See also *ibid* art. 240 (B) concerning the collection by the town of "all or part of the income from the police fines handed out for offences and violations committed on the territory of the commune" NB: framework law no.98-56 of 29 December 1998 provides for and punishes the offence of pollution (article 98). The public health code (order no.93-13 of 2 March 1993) provides for the punishment of pouring away and other forms of abandoning waste (articles 98 and 122 to 124 respectively).

³⁰ City of Niamey's role as organizing authority of PNCSS will be developed in Report 3 on the organization of the sector.

4. BUSINESS PLAN

4.1 Objectives and method

The STBV's business plan proposed as part of the previous study is based partly on the assumptions of the station detailed design report and partly on the diagnosis of the study for the development of City of Niamey's fecal sludge management services conducted by the EDE/G2C/ECOPSIS consortium. As presented, the business plan only makes projections over 4 years, cannot be used to carry out a sensitivity analysis and does not take into account the sector's breakeven point.

Consequently, the business plan has been reviewed and a financial model specifically developed.

The aim is, initially, to assess sector and operation costs over the whole period of analysis and, subsequently, define the resources necessary and the level of charges, fees and taxes to apply to cover all the sector's expenses and reach the breakeven point.

The principle used is based on covering all sector expenses by the resources collected (charges, fees, taxes, etc.).

Sector expenses consist of:

- STBV operating expenses (payroll expenses, operating costs, servicing and maintenance expenses and allowances for depreciation), plus the financial expenses borne by the operator to finance their equipment and their financial margin;
- Costs for sector control and monitoring and PNCSS management are borne by City of Niamey;
- Provisions for renewal of hydro-mechanical equipment;
- The financial margin for fecal sludge treatment fee collection by SEEN.

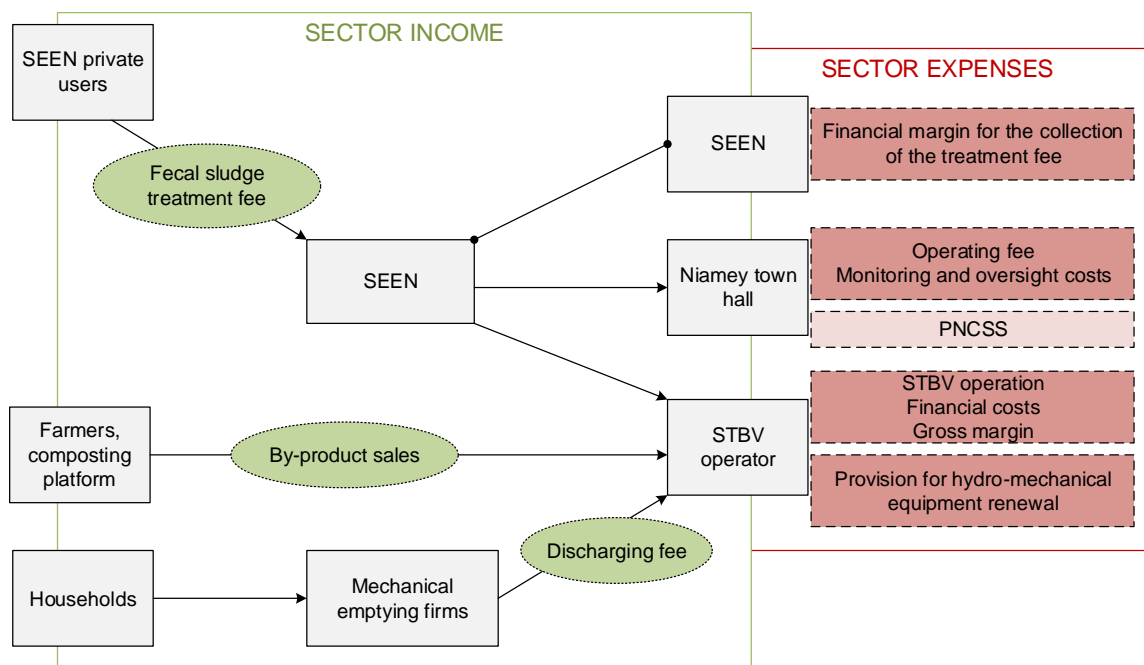
Potential resources are:

- The discharging fee, paid to the STBV operator by emptiers using the treatment station. This fee per m³ of sludge deposited is passed on by emptiers in the emptying bills paid by households;
- Income from the sale of by-products, received by the STBV operator;
- The fecal sludge treatment fee (RTBV in French), collected by SEEN on the potable water consumption invoices collected from its private users in Niamey. After deduction of the financial margin kept by SEEN, this fee is divided between the STBV operator and City of Niamey to cover their respective expenses.

All expenses must be covered by resources. Failing which, a municipal budget subsidy should be raised. Different scenarios of cost covering by resources have been developed.

The resulting financial flows are summarized in the diagram below.

Figure 1: Financial flows between the main sector actors



Financial projections for the sector and STBV operation have been drawn up on the basis of a set of technical-financial assumptions and parameters. Some parameters come from the business plan of the previous study. With the financial model, sensitivity analyses can be carried out, involving testing the impact of the measures chosen on the results through changes in the assumptions and parameters. In addition, a second scenario has been developed, taking into account alternative values for certain key parameters.

The analysis period is 15 years (2018-2032), that is 3 five-year periods. The first period, from 2018 to 2022, corresponds to the beginning of STBV operation and the first operating contract. At the end of the first contract, the assumptions from the business plan for the following period (2023-2028) could be reviewed and adjusted in accordance with the actual trend in by-product market development.

Expenses and income are expressed in current prices using an annual national inflation rate of 1% (average 2010-2015, World Bank). The energy cost inflation rate is 2%.

Water demand projections are based on the SPEN financial model, updated in November 2016 on the basis of 2015 data.

Below, we present the business plan assumptions and results in the basic scenario, in the following order:

- Sector expenses;
- Sector income and cost covering;
- The STBV's operation breakeven point.

4.2 Sector expenses

Sector expenses consist of:

- STBV operating expenses, consisting of operating expenses, including depreciation of its fixed assets;
- financial expenses and the financial margin of the STBV operator;
- costs for operator and emptying firm control and monitoring by City of Niamey;
- provisions for the renewal of STBV hydro-mechanical equipment;
- a SEEN financial margin for the collection of the sludge treatment fee on Niamey private users' water bills.

4.2.1 STBV operating expenses

4.2.1.1 Payroll expenses

19 staff members are assigned to the functioning of the STBV.

In terms of the personnel proposed in the business plan of the previous study, we suggest:

- the addition of a driver. This driver will be in charge of removing dried sludge, initially to the Koubia site quarries. The land on which the city dump is located, 25km from Niamey, has recently been acquired by City of Niamey. The feasibility study of this dump will show whether the removal of dried sludge to this dedicated site could be envisaged in the future.
- that the post of a GPS truck tracking platform coordination manager should only be filled as from 2021, in order to leave time to fit out the trucks.

The wage costs for each of the posts are set out in the table below.

Table8: STBV payroll expense assumptions

Personnel	Number	Wage cost (CFAF/employee/year)
Manager	1	3,300,000
Laborer	4	1,200,000
Worker	4	1,800,000
Watchman	3	1,500,000
Day laborer	5	900,000
Driver	1	1,200,000
GPS tracking manager	1	3,000,000
Total	19	

Payroll expenses are high, on average CFAF27.5m per year over the period 2018-2022. They represent over half the STBV's operating expenses (55%). This can be explained by the STBV's design itself, which is intended to function manually to a great extent (emptying of drying beds, etc.).

4.2.1.2 Functioning costs

In terms of the functioning costs assumed in the previous study (electricity, water and telephone, which have been used here), fuel expenses have been added. They cover the use of a generator to function one hour per day, as well as fuel for the sludge removal truck and the motor-driven pump.

Table9: STBV functioning cost assumptions

Operating	Unit	Annual quantity	Unit cost
Electricity	kWh	10,560	135
Water	m3	3,120	601
Telephone	Fixed amount	1	360,000
Fuel	Fixed amount	1	4,500,000

Functioning costs represent an average of CFAF8.5m over the period 2018-2022, or 17% of the STBV's operating expenses.

4.2.1.3 Service and maintenance expenses

In terms of the current service and maintenance expenses proposed in the previous business plan:

- A small amount (CFAF5/m3 of sludge) is planned for the removal of dried sludge from the station, corresponding to the dump discharging tax.
- The effluent analysis assumption has been slightly lowered: we are assuming that the amount of CFAF300,000 per month is allocated to more detailed effluent analyses (against an initially anticipated expense of CFAF1,000,000 every 3 months). Daily analyses will be carried out using a portable waste water analysis laboratory kit.

Table10: Service and maintenance expense assumptions

Service and maintenance	Unit	Annual quantity	Unit cost
Purchase small equipment	Fixed amount	1	1,400,000
Repair and routine service	Fixed amount	1	500,000
Disposal of screenings	Fixed amount	1	1,300,000
Disposal sand	Fixed amount	1	1,300,000
Removal dried sludge	m3	variable	5
Effluent analysis	Fixed amount	1	3,600,000

Service and maintenance expenses represent an average of CFAF8.4m per year over the period 2018-2022, or 17% of the STBV's operating expenses.

4.2.1.4 Allowances for depreciation

The previous business does not provide for initial investment at the operator's expense.

At the beginning of the contract, we plan for the purchase of a generator, a truck and 3 portable lab kits to be able to measure water and sludge quality on a daily basis. It is planned that this investment, financed by loan, should be repeated every 5 years. Depreciation of this equipment is entered under STBV's operating expenses.

Table11: Depreciation of operating and effluent analysis equipment

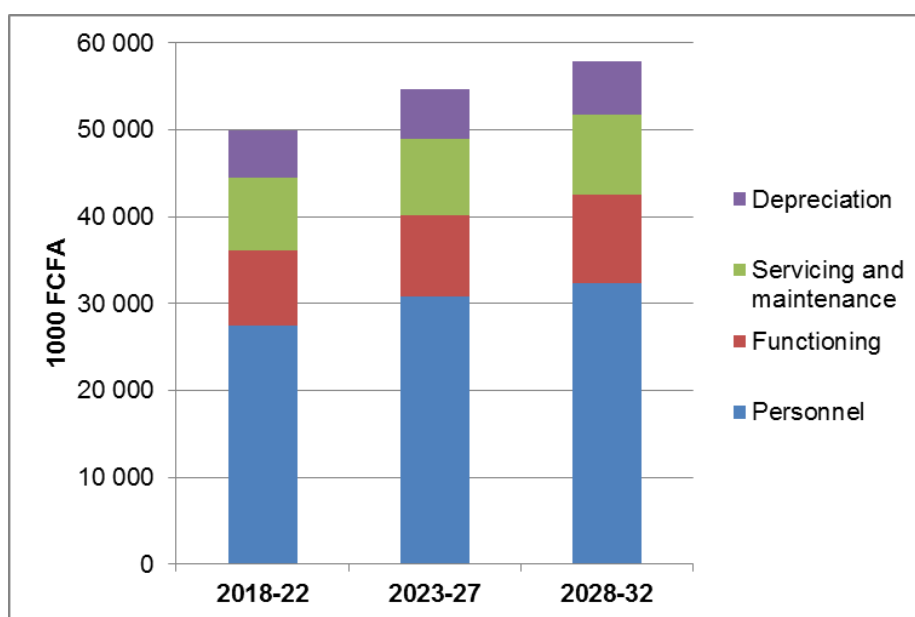
Equipment	Purchase value exclusive of tax (CFAF1,000)	Lifespan
Generator	4,677	5 years
Truck	23,384	5 years
3 aqualabo kits	4,365	2.5 years

Allowances for depreciation represent on average CFAF5.5m per year over the period 2018-2022, around 10% of operating expenses.

4.2.1.5 The STBV's operating expenses

The STBV's operating expenses, excluding financial costs and the operator's financial margin, average CFAF50m per year over the period 2018-2022. With inflation, they should reach CFAF58m per year on average over the period 2028-2032. The majority (55% over 2018-2022) consist of payroll expenses.

Figure 2: The STBV's operating expenses



4.2.2 Financial costs and the STBV operator's financial margin

4.2.2.1 Financial costs

Financial costs correspond to the repayment of loans contracted by the operator:

- In the short term, in 2018, to ensure sufficient available cash at the start of operation.
- In the medium term for investment financing (truck, generator and effluent analysis lab kit). Initial investment is made at the start of operation (2018) and repeated every 5 years.

Table12: Loan repayment terms and conditions

Loan terms and conditions	Short term	Medium term
Period of the loan	1 year	5 years
Annual interest rate	16%	10%
Terms of repayment	Constant annual installments	Constant annual installments

4.2.2.2 Operator's financial margin

In the basic scenario, the operator's gross margin (earnings before corporation tax/income) is estimated at 10% on average over the period of the first contract (2018-2022).

4.2.3 Other sector expenses

4.2.3.1 Control and monitoring costs for City of Niamey

Operator and emptying firm control costs are estimated at a fixed amount of CFAF5m per year over the period of analysis as a whole. This includes the wages of two permanent staff members in charge of control as well as the depreciation of two motorbikes (with a lifespan of 5 years).

The STBV's operating fee is set at 4% of the amounts collected in fecal sludge treatment fees.

4.2.3.2 Renewal of hydro-mechanical equipment

The STBV's hydro-mechanical equipment consists of a drying bed motor-driven feed pump, with a mobile thermal motor.

Provisions for the renewal of the motor-driven pump are entered as a sector expense, using the straight-line depreciation method. The piping connecting to the sleeves of the motor-driven pump, as well as the fastening clamps are not included. This amount shall be paid into a special account by the STBV operator which the latter will manage.

Table13: Renewal of hydro-mechanical equipment

Equipment	Purchase value exclusive of tax (CFAF1,000)	Planned duration of use
Motor-driven pump	2,513	2 years

Provision for renewal of the STBV's structural work is not provided for in the basic scenario.

4.2.3.3 SEEN financial margin

In return for collection of the fee on the water bill, SEEN's financial margin is set at 4% of the amounts collected. The amounts collected by SEEN correspond to 98% of the amounts billed.

4.3 Evaluation of sector income and cost coverage

4.3.1 Principles and scenarios

4.3.1.1 Principles of evaluation of income and cost coverage

Potential sector resources are:

- The discharging fee, paid to the STBV operator by emptiers using the treatment station and set according to the volumes discharged;
- Income from the sale of by-products, received by the STBV operator;
- The fecal sludge treatment fee (RTBV in French), collected by SEEN on the potable water consumption invoices collected from its private users in Niamey and determined in CFAF per m3 of water sold.

The aim is that the combination of these incomes should cover sector expenses as defined and evaluated in the previous paragraphs.

However, as mentioned previously, each of these resources is subject to constraints limiting the amounts that can be raised. These constraints are technical, environmental and commercial (sales of by-products), related to ability/willingness to pay (discharging fee and RTBV) and the players' breakeven points (discharging fee) or of a socio-economic and political nature (RTBV). Consequently, these resources could be supplemented by municipal subsidies.

When considering how to finance the sector, the most appropriate combination of these resources to cover costs needs to be established and, taking into account the constraints on the level of each of them, the amount of municipal subsidy that will have to be raised in addition needs to be defined.

4.3.1.2 Sales of by-products

The assumptions on sales of by-products are common to all the financing scenarios.

The study conducted previously does not include the marketing of by-products (stabilized sludge and residual water) the first three years of operation of the STBV. Marketing by-products assumes (i) proper knowledge of product quality, based on reliable quality measurements; (ii) that potential customers are convinced of the benefit of the products on sale and (iii) the existence of a solvent market.

These assumptions are kept in the business plan for the first 5 years of operation. During this period, the STBV operator will focus on:

- development of the fecal sludge treatment service by helping to convince emptiers of the benefit of using the station as a discharging place;
- monitoring and control of the quality of the sludge produced;
- development of the by-product market.

Consequently, the income from sales of by-products is considered as nil over the period 2018-2022.

At the end of the first contract, stabilized sludge marketing and/or residual water business could be developed by the operator and the revenues generated included in the operator's business plan. In return, a municipal tax on the income from this business could be included.

According to the detailed design report, stabilized sludge reusable in farming with no health risks produced by treatment at the station represents only:

- 7% of the volume of sludge entering the STBV in dry periods (10 months), that is 35m³ per day;
- 2.6% of the volume of sludge entering the STBV in wet periods (2 months), that is 12m³ per day³¹.

It is also assumed that:

- the volume coming into the station represents at best 90% of the volume that could be treated by the station on a daily basis;
- the STBV resells at best 40% of this stabilized sludge to potential customers;
- the selling price per m³ of stabilized sludge could be set initially at CFAF500³².

Consequently, annual income from sales of stabilized sludge to farmers and other potential customers represents at most **CFAF1.6m**, or 3% of the STBV's expenses, whatever the financing scenario.

4.3.1.3 Sector financing scenarios

Four financing scenarios are defined.

Scenario 1: Breakeven discharging fee

In this scenario, most of the sector's resources come from the discharging fee. The RTBV is not implemented and no municipal subsidy is raised. By-product sales generate revenues for the STBV operator as from the 5th year.

The breakeven discharging fee is set in such a way that the income it generates covers all the sector's financing needs, taking into account the STBV's incoming volumes and the income from by-product sales.

Scenario 2: Discharging fee and additional subsidy

In this scenario, the discharging fee is set at the amount considered as its ceiling (CFAF300/m³ – see paragraph 2.2.2). The RTBV is not implemented and by-product sales generate revenues for the STBV operator as from the 5th year.

Consequently, the sector will break even through a municipal subsidy. This subsidy is covered by the municipal budget and can be allocated in return for a tax collected by the municipality's tax department under conditions which remain to be defined.

³¹ In wet periods (2 months), if it is to be reused in farming, stabilized sludge must also be sanitized, which implies additional drying time in special covered sheds.

³² According to the previous study.

Scenario 3: Discharging fee and fecal sludge treatment fee

In this scenario, the discharging fee is also set at the amount considered as its ceiling (CFAF300/m³ – see paragraph 2.2.2). No municipal subsidy is raised and by-product sales generate revenues for the STBV operator as from the 5th year.

Consequently, the RTBV level is set in such a way that the income generated will ensure that the sector breaks even.

Scenario 4: Discharging fee and fecal sludge treatment fee (variant)

This scenario is a variant of the previous one. The discharging fee is set at a level below the amount considered as its ceiling during the initial years of operation to encourage emptiers to use the STBV. The fee is then increased progressively to its ceiling level³³. The fee is set at CFAF100/m³ for the first 5 years, CFAF200/m³ for the next 5 years and CFAF300/m³ after that.

No municipal subsidy is raised and by-product sales generate revenues for the STBV operator as from the 5th year.

The RTBV level is set in such a way that the income generated will ensure that the sector breaks even.

Table14: Summary of the financing scenarios

Resources	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Discharging fee	Breakeven	CFAF300/m ³	CFAF300/m ³	Ph1: CFAF100/m ³ Ph2: CFAF200/m ³ Ph3: CFAF300/m ³
Sales of by-products	Ph1: 0 Ph2&3: F1.6m/year	Ph1: 0 Ph2&3: F1.6m/year	Ph1: 0 Ph2&3: F1.6m/year	Ph1: 0 Ph2&3: F1.6m/year
RTBV	0	0	Breakeven	Breakeven
Subsidy	0	Breakeven	0	0

4.3.2 Scenario 1: Breakeven discharging fee

In this scenario, it is the discharging fee which provides the main part of the sector's financing and cost coverage. This fee is estimated on the basis of assumptions on the volumes entering the STBV (see section 2.1.2).

Over the period 2018-2022, it is estimated that the total volume of sludge deposited in the STBV will be 426,816m³ as the station develops. Over the following five-year periods (2023-2027 and 2028-2032), this volume will reach 640,224 m³, on the assumption that the STBV will be used at 90% of its total capacity.

³³ This mechanism is explained in section 2.2.2.

In the absence of revenues from by-product sales and the RTBV, if the STBV's operating expenses (CFAF250m in total over the period 2018-2022) are to be covered by the discharging fee alone, it would need to be set at **CFAF585/m3, or CFAF4700/truck**. After that, it could be reduced thanks to greater use of the STBV and growth in revenues from by-product sales, although without falling below CFAF415/m3.

Covering other expenses (control and monitoring by City of Niamey, provision for equipment renewal, financial costs and operating margin) would mean increasing the discharging fee to an even higher level or relying on municipal subsidies.

This level of discharging fee is incompatible with the aim of encouraging emptiers firms to use the STBV without significantly affecting their margins or making emptying costs more expensive for households.

Table15: Scenario 1 – Breakeven discharging fee

		2018-2022	2023-2027	2028-2032
Incoming volumes of sludge	m3	426,816	640,224	640,224
STBV operating expenses	CFAF1000	249,508	273,579	289,371
Revenues from by-product sales	CFAF1000	0	7,988	7,988
Breakeven discharging fee	CFAF/m3	585	415	440

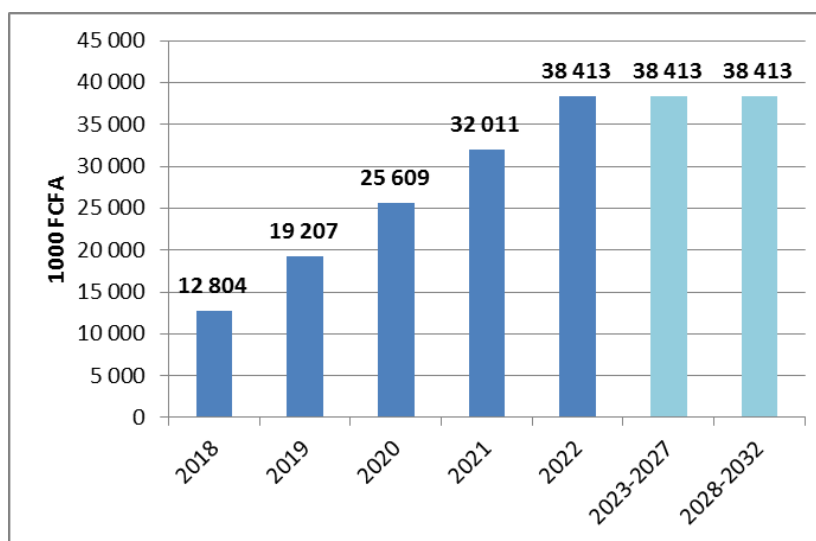
Therefore, this **scenario does not seem realistic** and the discharging fee alone will not be enough to finance the sector.

4.3.3 Scenario 2: Discharging fee and subsidy

In this scenario, the discharging fee is set at the amount considered as its ceiling (CFAF300/m3) and a municipal subsidy is raised to complete sector financing.

In charging this fee, based on the volumes coming into the STBV, the revenues generated will increase from CFAF12.8m in 2018 to an annual maximum of CFAF38.4m in 2022. Over the period 2018-2022, on average, the revenues generated by this fee will cover only 40% of financing requirements.

Figure 3: Scenario 2 – Discharging fee



CFAF192.1m in municipal subsidies over the period 2018-2022, that is an average of around CFAF38.4m per year will have to be raised to cover financing requirements, however without generating any margin for PNCSS.

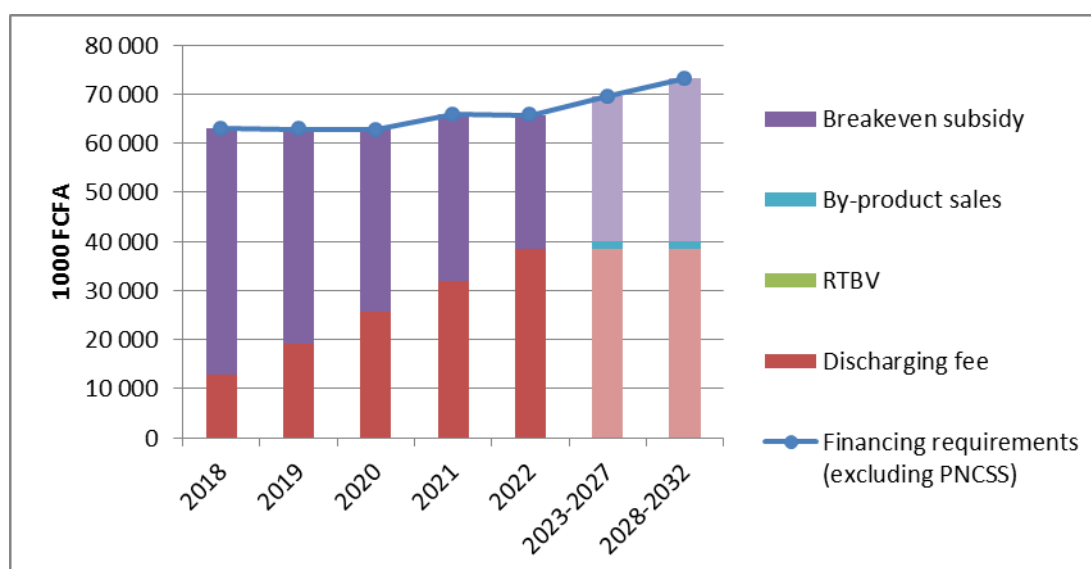
This subsidy is covered by the municipal budget and can be allocated in return for a tax collected by the municipality's tax department under conditions which remain to be defined. It may seem modest compared with City of Niamey's budget (0.14% of City of Niamey's ordinary 2017 budget – CFAF26.9bn). It represents less than CFAF160/household/year.

Table16: Scenario 2 – Sector financing

CFAF1000	2018	2019	2020	2021	2022	2023-27	2028-32
Financing requirements*	63,037	62,813	62,703	65,910	65,719	69,491	73,125
City of Niamey control/monitoring	5,000	5,000	5,000	5,000	5,000	5,000	5,000
STBV operation	47,700	48,190	48,675	52,204	52,739	54,716	54,716
Prov. renewal STBV equip.	1,256	1,256	1,256	1,256	1,256	1,256	1,256
STBV financial costs	3,403	2,711	2,127	1,485	778	2,196	2,196
STBV operating margin	5,678	5,656	5,645	5,965	5,946	6,324	6,324
Income	12,804	19,207	25,609	32,011	38,413	40,011	40,011
Discharging fee	12,804	19,207	25,609	32,011	38,413	38,413	38,413
RTBV	0	0	0	0	0	0	0
Sales of by-products	0	0	0	0	0	1,598	1,598
Breakeven subsidy	50,233	43,607	37,094	33,899	27,306	29,480	33,114

* excluding PNCSS

Figure 4: Scenario 2 – Sector financing



However, it does not seem likely that basing a large part of sector financing on a City of Niamey budgetary subsidy will ensure the continued existence of the mechanism. Sustainable, dedicated resources would be more appropriate for the involvement of a private partner in the operation of the STBV. **This scenario does not seem sufficiently reassuring over the long term.**

4.3.4 Scenario 3: Discharging fee and RTBV

In this scenario, the discharging fee is at the same level in scenario 2 (CFAF300/m3) but the financing is supplemented by the RTBV and no subsidy is raised.

The RTBV is assessed on the basis of the projection of sector expenses and other income (discharging fee and sales of by-products). It is determined in CFAF per m3 of potable water sold to private users by SEEN (collection base) in Niamey.

The volumes of potable water billed by SEEN to its private customers are extracted from the SPEN financial model, updated in November 2016 on the basis of 2015 data. These volumes form the RTBV assessment basis. They grow from 28.6m m3 in 2018 to 34m m3 in 2022.

Table17: Assessment basis of the fecal sludge treatment fee

1000 m3	2018	2020	2022	Average 2023-27	Average 2028-32
Volumes of potable water billed by SEEN to private users	28,620	31,678	34,047	37,980	46,546

The breakeven RTBV is the fee which will enable the sector to break even over the period 2018-2022, that is to cover all the sector's expenses by income from the sector. It is applied on the amounts collected on SEEN's potable water bills to its private customers, based on a collection rate estimated at 98%.

The average amount of the RTBV enabling the sector to reach breakeven point over the period 2018-2022 is CFAF1.5/m3.

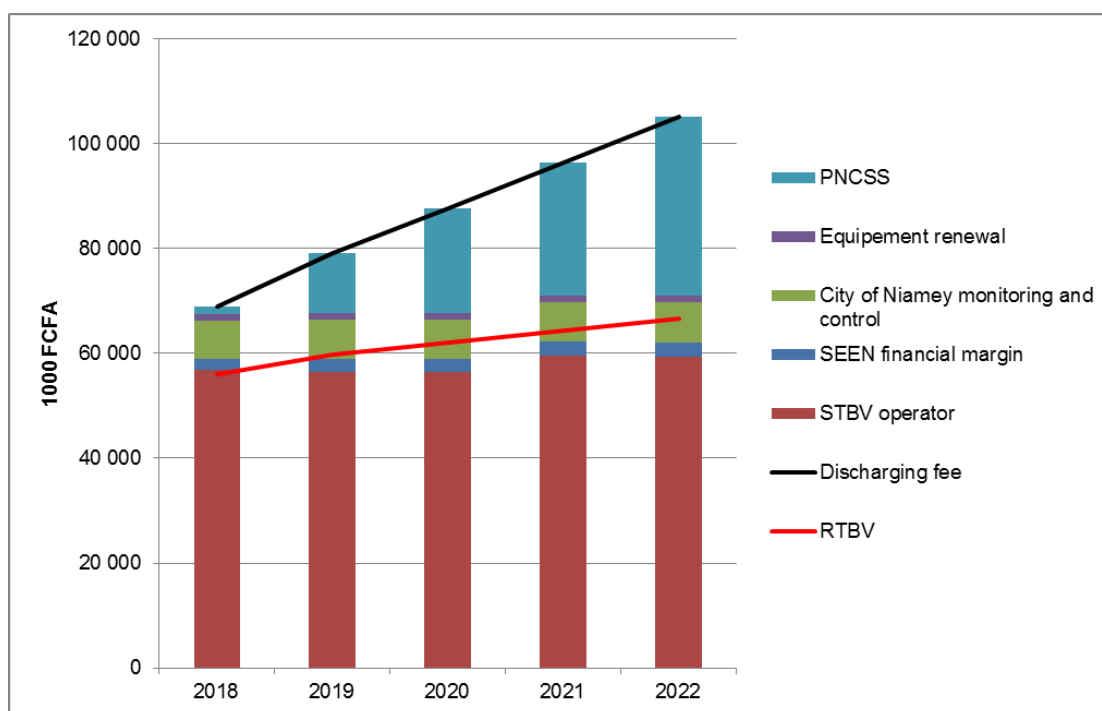
We propose setting the amount of the RTBV at CFAF2/m3. In addition to the discharging fee, this level of fee will not only cover sector expenses over the period 2018-2022 but also produce a remainder of CFAF92.3m in total. This remainder, transferred to City of Niamey, will enable it to develop PNCSS, through the financing of sanitation communication and awareness-raising campaigns for the public.

Table18: Scenario 3 – Sector financing

CFAF1000	2018	2019	2020	2021	2022	2023-27	2028-32
Financing requirements*	67,525	67,604	67,670	71,059	71,058	75,447	80,424
Collection costs SEEN	2,244	2,396	2,484	2,575	2,669	2,978	3,649
City of Niamey control/monitoring	7,244	7,396	7,484	7,575	7,669	7,978	8,649
STBV operation	47,700	48,190	48,675	52,204	52,739	54,716	57,874
Prov. renewal STBV equip.	1,256	1,256	1,256	1,256	1,256	1,256	1,256
STBV financial costs	3,403	2,711	2,127	1,485	778	2,196	2,308
STBV operating margin	5,678	5,656	5,645	5,965	5,946	6,324	6,687
Income	68,900	79,094	87,697	96,380	105,145	114,453	131,241
Discharging fee	12,804	19,207	25,609	32,011	38,413	38,413	38,413
RTBV	56,095	59,888	62,088	64,369	66,732	74,442	91,230
Sales of by-products	0	0	0	0	0	1,598	1,598
PNCSS	1,375	11,490	20,027	25,321	34,087	39,006	50,817

* excluding PNCSS

Figure 5: Scenario 3 – Sector financing



The RTBV, collected by SEEN on the potable water bills of its private customers in Niamey, is divided between the different sector players to enable each of them to cover their costs. On average, over the period 2018-2022:

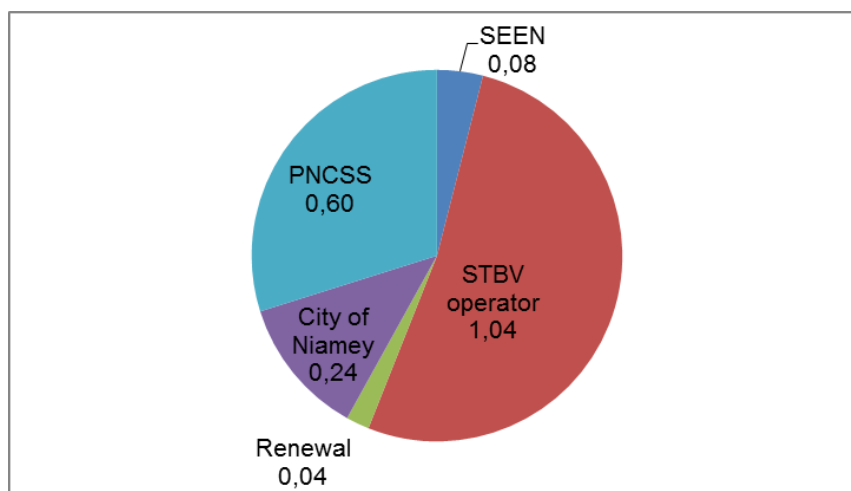
- the STBV operator should receive CFAF1.04/m³, to cover its expenses to remunerate its operating activity, after deduction of discharging income, and CFAF0.04/m³ for the renewal of electro-mechanical equipment;
- City of Niamey would receive CFAF0.24/m³ to cover its sector monitoring and control expenses;
- SEEN would keep CFAF0.08/m³ to cover its fee collection management expenses.

Finally, the remainder is estimated at CFAF0.60/m³ of water and would be allocated to PNCSS.

Table19: Scenario 3 – Distribution of the RTBV

	Av 2018-2022 (CFAF/m ³)	%
SEEN – Collection	0.08	4%
STBV operator – Operation	1.04	52%
STBV operator – Renewal	0.04	2%
City of Niamey – Control and monitoring	0.24	12%
City of Niamey – PNCSS	0.60	30%
Total	2.00	100%

Figure 6: Scenario 3 – Distribution of the RTBV



This fee remains relatively modest compared with the average potable water tariff at present invoiced by SEEN (around CFAF300/m³) and, therefore, seems acceptable to potable water service users.

It could be reviewed at the end of the first five-year period (2018-2022) on the basis of the development of the service and various factors: STBV operation performance; trend in discharging fee income; development of by-product marketing; development of a second STBV; etc.

This scenario has the advantage of offering independent, secure financing of the sector, but remains risky. Introduction of the RTBV has little impact on household potable water bills. On the other hand, the discharging fee could be considered as high by emptiers that might stop using the STBV or pass on its cost to the emptying price paid by households.

4.3.5 Scenario 4: Discharging fee and RTBV

This scenario is a variant of scenario 3 in which the discharging fee is set at CFAF100/m³ for the first 5 years, CFAF200/m³ for the next 5 years and CFAF300/m³ after that. This gradual rise is designed to encourage emptiers to use the STBV as soon as it is commissioned and to rapidly introduce virtuous management of the sector.

No municipal subsidy is raised and by-product sales generate revenues for the STBV operator as from the 5th year. The RTBV will ensure that the sector breaks even.

The average amount of the RTBV enabling the sector to reach breakeven point over the period 2018-2022 is CFAF2.1/m³.

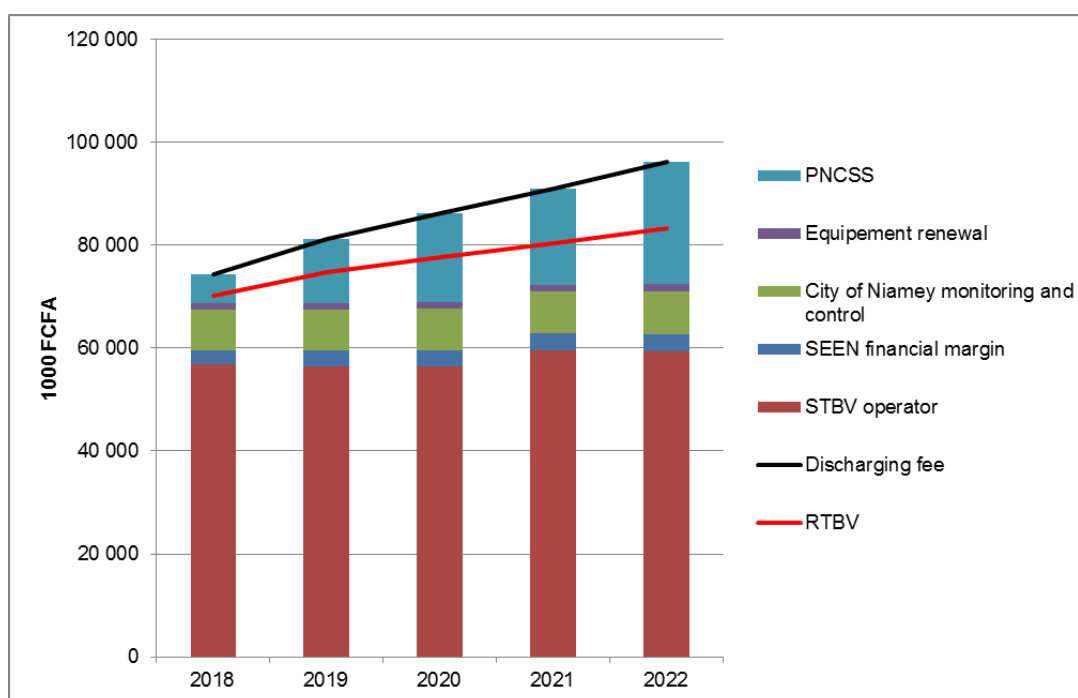
We propose setting the amount of the RTBV at CFAF2.5/m³. In addition to the discharging fee, this fee will not only cover sector expenses over the period 2018-2022 but also produce a remainder of CFAF78m in total. This remainder, transferred to City of Niamey, would enable it to develop PNCSS, through the financing of sanitation communication and awareness-raising campaigns for the public.

Table20: Scenario 4 – Sector financing

CFAF1000	2018	2019	2020	2021	2022	2023-27	2028-32
Financing requirements*	68,647	68,802	68,912	72,347	72,393	76,936	82,248
Collection costs SEEN	2,805	2,994	3,104	3,218	3,337	3,722	4,562
City of Niamey control/monitoring	7,805	7,994	8,104	8,218	8,337	8,722	9,562
STBV operation	47,700	48,190	48,675	52,204	52,739	54,716	57,874
Prov. renewal STBV equip.	1,256	1,256	1,256	1,256	1,256	1,256	1,256
STBV financial costs	3,403	2,711	2,127	1,485	778	2,196	2,308
STBV operating margin	5,678	5,656	5,645	5,965	5,946	6,324	6,687
Income	74,387	81,262	86,147	91,131	96,219	120,259	154,049
Discharging fee	4,268	6,402	8,536	10,670	12,804	25,609	38,413
RTBV	70,119	74,860	77,610	80,461	83,415	93,052	114,038
Sales of by-products	0	0	0	0	0	1,598	1,598
PNCSS	5,740	12,460	17,235	18,785	23,827	43,323	71,800

*excluding PNCSS

Figure 7: Scenario 4 – Sector financing



The RTBV, collected by SEEN on the potable water bills of its private customers in Niamey, is divided between the different sector players to enable each of them to cover their costs. On average, over the period 2018-2022:

- the STBV operator should receive CFAF1.59/m³, to cover its expenses to remunerate its operating activity, after deduction of discharging income, and CFAF0.04/m³ for the renewal of electro-mechanical equipment;
- City of Niamey would receive CFAF0.26/m³ to cover its sector monitoring and control expenses;

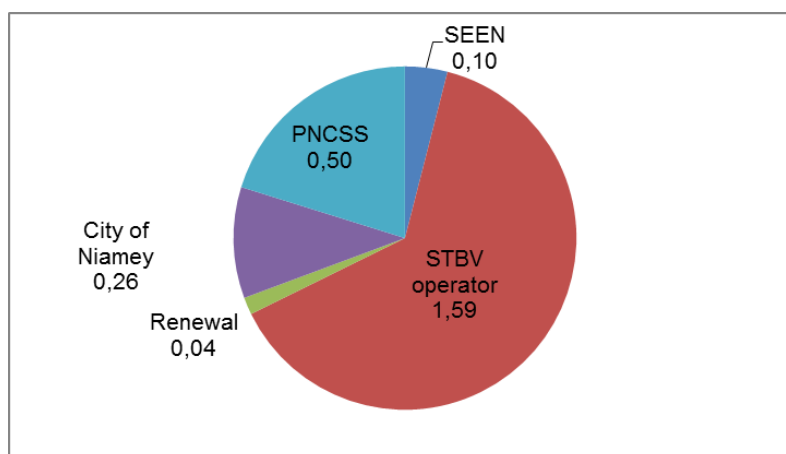
- SEEN would keep CFAF0.10/m³ to cover its fee collection management expenses.

Finally, the remainder is estimated at CFAF0.50/m³ of water and would be allocated to PNCSS.

Table21: Scenario 4 – Distribution of the RTBV

	Av 2018-2022 (CFAF/m ³)	%
SEEN – Collection	0.10	4%
STBV operator – Operation	1.59	64%
STBV operator – Renewal	0.04	2%
City of Niamey – Control and monitoring	0.26	10%
City of Niamey – PNCSS	0.50	20%
Total	2.50	100%

Figure 8: Scenario 4 – Distribution of the RTBV



Although naturally greater than in scenario 3, the RTBV remains modest compared with the average potable water tariff at present invoiced by SEEN (around CFAF300/m³) and, therefore, seems acceptable to potable water service users.

It could be reviewed at the end of the first five-year period (2018-2022) on the basis of the development of the service and various factors: STBV operation performance; trend in discharging fee income; development of by-product marketing; development of a second STBV; etc.

Compared with scenario 3, scenario 4 has the advantage that it makes the STBV less expensive for emptiers and therefore is a better guarantee for improvement of the fecal sludge management sector in Niamey. The RTBV remains at a modest level for households. **This scenario seems the most balanced.**

4.3.6 Conclusions and recommendation

Analysis of these four scenarios brings out the following points:

- **Basing sector financing on the discharging fee alone (scenario 1) is not realistic.** The fee is too high (at least CFAF585/m³ to merely cover the STBV's operating costs) to be charged without affecting emptiers' margins and emptying prices paid by households. It could deter emptiers from using the STBV, thus upsetting the balance of the project. This scenario should be rejected.

- **Using a City of Niamey budget subsidy** (CFAF192m over the period 2018-2022), **in addition to a reasonable discharging fee** (CFAF300/m³) **is unlikely to ensure financing of the sector over the long term.** Sustainable, dedicated resources must be raised to ensure the involvement of a private partner in the operation of the STBV.
- **The combination of a reasonable discharging fee** (CFAF300/m³) **and an RTBV for SEEN private users** (CFAF2/m³ of potable water) is necessary. This scenario has the advantage of offering independent, secure financing of the sector, but remains risky. Introduction of the RTBV has little impact on household potable water bills. On the other hand, the discharging fee could be considered as high by emptiers firms that might stop using the STBV or pass on its cost to the emptying price paid by households.
- **A discharging fee set at a lower level at the beginning of the period** (CFAF100/m³) **combined with a higher RTBV** (CFAF2.5/m³) **is the optimal scenario.** It limits the risk of emptiers avoiding the station or passing on the fee to emptying prices due to a high discharging fee. The impact of the RTBV on household water bills remains very modest.

Consequently, **scenario 4 is recommended:**

- Introduction of a discharging fee of CFAF100/m³ over the period 2018-2022, increasing to CFAF200/m³ over the period 2023-2027 and CFAF300/m³ over the period 2028-2032;
- An RTBV of CFAF2.5/m³ of potable water on SEEN private users' water bills;
- No breakeven budgetary subsidy is necessary.

4.4 The STBV's operation breakeven point

The STBV's operation breakeven point is verified under scenario 4, the recommended scenario.

The fees set will cover sector costs. A large part of the income is destined to cover the costs of the STBV and make it profitable for a financially independent operator to operate.

The STBV's income comes from the RTBV, the discharging fee and the sale of by-products produced. Costs consist of operating costs (payroll, functioning and depreciation costs), financial costs and tax on profits. A sufficient financial margin must be made to attract a private operator.

The STBV's operation breakeven point is estimated over the first five-year period (2018-2022).

4.4.1 STBV operating expenses

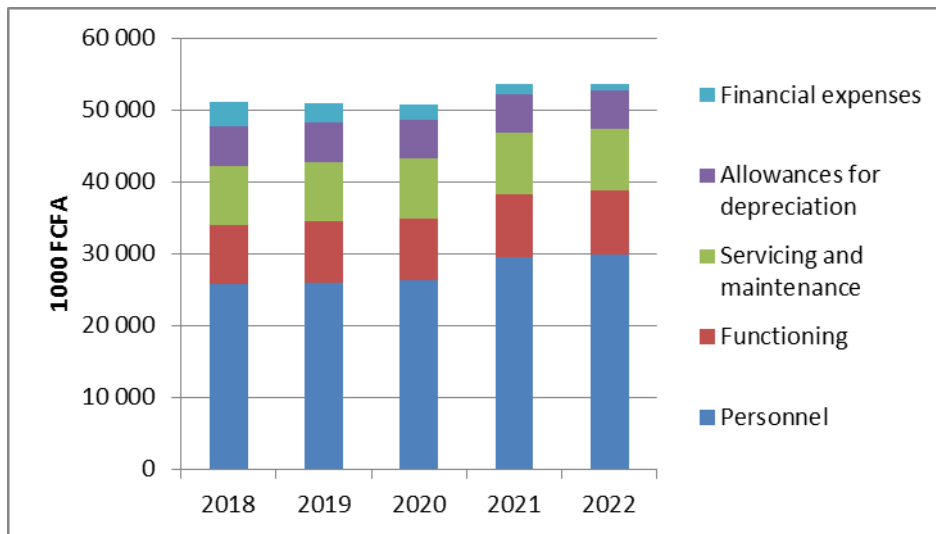
Payroll costs represent the majority of the STBV's operating expenses. They amount to CFAF26m per year over the first 3 years of operation and approach CFAF30m the last two years with the hiring of a truck GPS tracking platform manager.

Functioning expenses and service and maintenance expenses each amount to over CFAF8m per year. CFAF5.4m is earmarked for depreciation allowances each year.

Financial expenses are relatively high the first year of operation (CFAF3.4m) due to short-term loans raised to finance cash requirements. Subsequently, they consist of the repayment of medium-term borrowing to finance operating investment, the cash position not requiring additional short-term borrowing.

Over the period, STBV expenses represent between CFAF51m and CFAF53.7m per year.

Figure 9: STBV expenses



4.4.2 STBV operating income

After deduction of the SEEN financial margin (4% of the income collected), the monitoring and control fee and the PNCSS fee, paid to City of Niamey, the RTBV collected forms the STBV's main operating income.

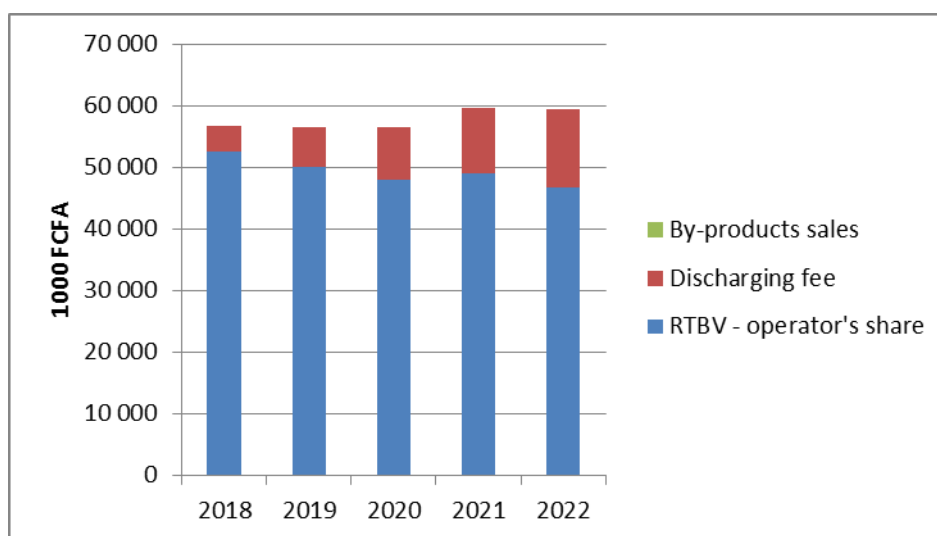
Part of the STBV (sic) received by the operator will be earmarked for renewal of the station's hydro-mechanical equipment. To this end, a provision will be made in the form of an allocation to a dedicated bank account managed by the STBV operator.

The whole of the discharging fee belongs to the STBV. It is collected directly by the STBV operator at the station, at every discharge by emptying trucks.

The sale of by-products from STBV sludge treatment will depend on the operator's ability both to guarantee the quality of stabilized sludge for marketing and to develop the market. The basic scenario does not include any income from sales of by-products in the first five-year period. If the operator were able to produce sufficiently high quality sludge and sell it before 2023, all the profit from these sales would belong to them.

Over the period, STBV income represents between CFAF56.8m and CFAF59.4m per year.

Figure 10: STBV income



4.4.3 STBV balance

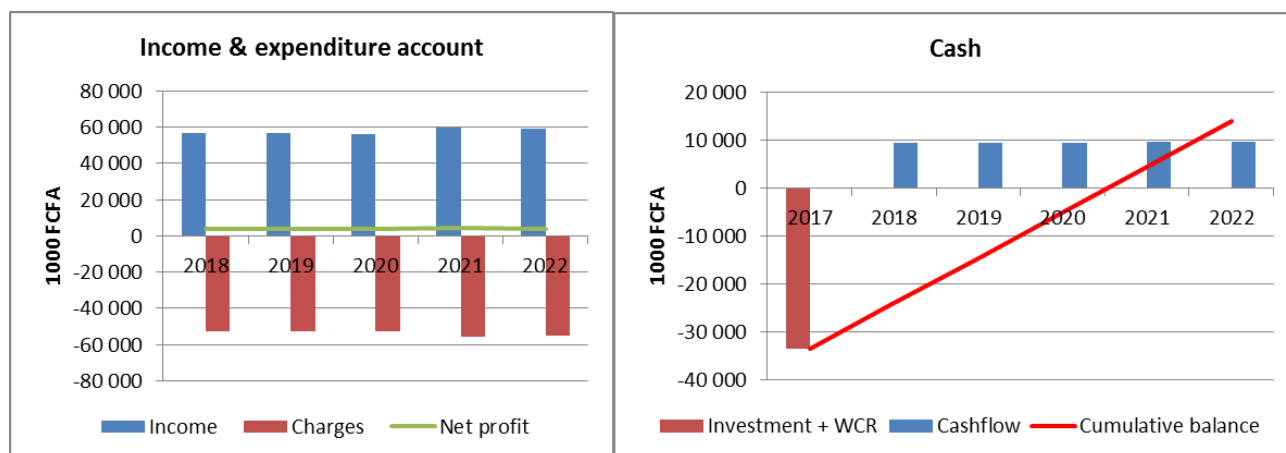
Every year, operation of the STBV generates net profit of the order of CFAF4m, that is 7% of operating income. The cash generated (CFAF9.5m per year) is sufficient to meet requirements. The cumulative cash balance reaches CFAF15m in 2022 and the return on capital invested is 13%.

Under the remuneration conditions set, operation of the STBV makes a profit, is solvent and sufficiently profitable to attract a private operator.

Table22: Estimated STBV income and expenditure account

CFAF1000	2018	2019	2020	2021	2022
Income	56,781	56,557	56,447	59,654	59,463
RTBV - operator's share	52,513	50,155	47,910	48,983	46,659
Discharging fee	4,268	6,402	8,536	10,670	12,804
Sale by-products	0	0	0	0	0
Expenses	51,103	50,901	50,802	53,688	53,517
<i>% income</i>	<i>90%</i>	<i>90%</i>	<i>90%</i>	<i>90%</i>	<i>90%</i>
Personnel	25,755	26,013	26,273	29,565	29,861
Functioning	8,302	8,445	8,591	8,740	8,891
Service and maintenance	8,194	8,283	8,361	8,449	8,537
Allowances for depreciation	5,450	5,450	5,450	5,450	5,450
Financial costs	3,403	2,711	2,127	1,485	778
Gross profit	5,678	5,656	5,645	5,965	5,946
<i>% of income</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>
Corporation tax	1,703	1,697	1,693	1,790	1,784
Net profit	3,975	3,959	3,951	4,176	4,162
<i>% of income</i>	<i>7%</i>	<i>7%</i>	<i>7%</i>	<i>7%</i>	<i>7%</i>
Cash flow	9,424	9,409	9,401	9,625	9,612

Figure 11: The STBV's operating financial performance



4.5 Sensitivity analyses

Sensitivity analyses have been carried out on the recommended scenario, number 4, considered as the basic scenario.

The aim of a sensitivity analysis is to assess the impact of changes in the simulation's key parameters and assumptions on its results. Four sensitivities were tested.

- **Sensitivity 1: Increase in the financial margin for RTBV collection by SEEN from 4% to 10%**

The amount of the RTBV enabling the sector to break even is increased to CFAF2.2/m³ of water billed over 2018-2022. By maintaining the RTBV at CFAF2.5/m³ of water billed, the balance for PNCSS financing is reduced to an average of CFAF11m per year over 2018-2022, that is around -30% compared with the basic scenario.

- **Sensitivity 2: Increase in the STBV operator's gross operating margin from 10% to 20%**

The amount of the RTBV enabling the sector to break even is increased to CFAF2.3/m³ of water billed over 2018-2022. By maintaining the RTBV at CFAF2.5/m³ of water billed, the balance for PNCSS financing is then only an average of CFAF8.7m per year over 2018-2022, that is around -45% compared with the basic scenario.

- **Sensitivity 3: Increase in the operating fee for City of Niamey from 4% to 8%**

The amount of the RTBV enabling the sector to break even is increased to CFAF2.2/m³ of water billed over 2018-2022. By maintaining the RTBV at CFAF2.5/m³ of water billed, the balance for PNCSS financing averages CFAF12.5m per year over 2018-2022, that is -20% compared with the basic scenario.

- **Sensitivity 4: A provision for the structural renewal of the STBV paid for by the RTBV**

Based on a plant lifespan of 25 years and straight-line depreciation, the additional cost to be borne by the RTBV is CFAF55m per year.

Table23: Provision for structural renewal of the STBV

CFAF1000	Cost of construction	Depreciation installments
Priority tranche ³⁴	1,199,481	47,979
Optional tranche ³⁵	193,675	7,747
Total works	1,393,156	55,726

The amount of the RTBV enabling the sector to break even is increased to CFAF4/m³ of water billed over 2018-2022, double the basic scenario. It will only be possible for the sector to break even with a significant increase in the RTBV. In setting it at CFAF 4/m³ of water billed, the balance for PNCSS would amount to an average of CFAF5.2m per year over the period.

Table24: Sensitivity analyses

	Unit	Basic scenario	SEEN collection margin 4->10%	STBV gross operating margin 10->20%	City of Niamey operating fee 4->8%	STBV structural renewal
Breakeven RTBV	CFAF/m ³	2.1	2.2	2.3	2.2	4.0
RTBV applied	CFAF/m³	2.5	2.5	2.5	2.5	4.0
RTBV income	CFAF1000	77,293	77,293	77,293	77,293	123,669
Average annual balance (PNCSS)	CFAF1000	15,609	10,972	8,658	12,518	5,194

Sensitivity analyses show the relative robustness of the proposed financing system. A change in the SEEN collection margin, the STBV operator's gross target margin or City of Niamey operating fee can be borne by maintaining an RTBV of CFAF2.5/m³. The resources allocated to PNCSS are, however, reduced, in the case of an increase in the STBV operator's target margin.

On the other hand, paying for the renewal of the structure part of the STBV from the RTBV would lead to a significant increase in it to ensure the sector breaks even. It would have to be increased to CFAF4/m³ instead of CFAF2.5/m³ in the basic scenario. The level of the RTBV remains modest, however, compared with the average potable water tariff Niamey users are charged.

³⁴ The priority tranche consists of: general lump sums, the 4 ponds for trash, sand and sedimentation removal, sludge pumping, the 120 drying beds, the control room and the watchman's accommodation, the 4 plant-purification ponds, roads and access and ancillary works.

³⁵ The optional tranche consists of the building of the main access and internal roads, the installation of a weigh bridge and the purchase of electro-magnetic flow rate meters. An amendment is being negotiated for additional works (drying shed, storage warehouse, irrigation system for watering the hedge, increase of the electric line and increase of the site enclosure). When the cost of this clause is known, it could be taken into account instead of the optional tranche.

5. INVITATION TO TENDER STRATEGY AND DOCUMENT UPDATING

5.1 Proposals for adjustment to the invitation to tender strategy

5.1.1 Choice of procedure

In the previous study, the options for the invitation to tender procedure were analyzed and the choice was that of an open, national invitation to tender procedure. This choice is justified in many respects:

- the STBV is designed for relatively simple and inexpensive operation. Thus, as long as support is provided at startup, operation of the station does not require detailed expertise which would not be available locally,
- given the security aspect, it is probable that very few international operators would be interested in an activity in Niger, and if they were to be, this would result in a higher cost,
- a national operator would in any case be a lot less expensive than an international operator that would have to have at least one expat employee and given the sector's ability to raise financial resources, this point is important for the cost of operating the STBV and the sector's financial balance,
- a national, open invitation to tender optimizes the time needed to sign the contract (no pre-selection phase). A pre-selection phase would have given an initial glimpse of the tenderers for the operation of the STBV, and perhaps allowed certain adjustments to be made in the invitation to tender file in accordance with the market, but the clarification request phase of the open invitation to tender procedure will also allow certain adjustments to be made, where applicable, depending on tenderers' questions.

For these different reasons we agree with the local authorities' choice of procedure in the previous study.

5.1.2 Recommendations for the implementation of the procedure chosen

In order to ensure successful recruitment of an operator for the STBV, the invitation to tender can only be put out when the conditions for operation of the station are clear, specifically the technical conditions for operation and those for financing the activity. No operator would want to submit a tender if the risk on their remuneration seems too high, if the returns on their activity seem insufficient or if the conditions for operation (quality requirements for residual water and sludge, treatment process, volumes to treat, etc.) are not well enough defined.

These points are not always clear in the existing documents. While it is sometimes only a case of clarification and detail which can be rapidly approved, the business plan review led to fundamental changes in terms of the previous proposals which affect the invitation to tender strategy, modifying the method of sector financing and therefore the actual type of partnership proposed.

Four prerequisites to putting out the invitation to tender have thus emerged:

- The creation of a fecal sludge treatment fee (RTBV): this fee should finance the development of the sanitation sector. It could be set initially at CFAF2.5/m³ of water billed in Niamey for private users (recommended scenario). As we have already said, set at this level, it would finance the collection of this fee by SEEN, the functioning of the Koubia STBV (on the basis of the remuneration required by the operator, resulting from the competition generated by the invitation to tender), the functions of oversight and delegating authority fulfilled by City of Niamey and the renovation of the STBV (hydro-mechanical equipment). This fee must be established by City of Niamey through a municipal order.
- The preparation and negotiation of a specific contract for the functions of RTBV collection/transfer with SEEN. It is proposed that this fee should be collected by SEEN on water bills and that SEEN retains its provision of service remuneration then directly transfers the amounts due to the STBV operator, on the one hand, and City of Niamey, on the other, thus shortening the payment process. These mechanisms must be set contractually and City of Niamey must consult with SEEN for that³⁶.
- In addition, since this is a new type of contract and therefore a new type of invitation to tender, it would be beneficial for City of Niamey to be supported by specialized technical assistance throughout the procurement procedure, specifically once the invitation to tender has been put out, to support it on questions/answers to tenderers (which could lead to changes in the draft contract), on the technical and financial assessment of the tenders received and on the finalization and signature of the operating contract with the successful tenderer.
- Finally, it is essential that the operator should have the operating license for the STBV, classified among the dangerous, troublesome or unhealthy establishments listed in decree no.76-129 of 31 July 1976. City of Niamey should therefore start the procedure to apply for an operating license from the ministry for mining very quickly.

5.1.3 Implications of the choice of procedure

While the choice to recruit a national operator is the right one, specifically in the long-term vision of local skills development, it requires certain support measures to ensure the launch of the fecal sludge treatment business, both on the operator's side and City of Niamey side, as delegating authority and organizing authority of the public independent or non-collective sanitation service (PNCSS).

Thus, in parallel to the operator recruitment process, it is necessary to start two other technical assistance recruitment processes:

- Technical assistance for City of Niamey, which will have the main mission of:
 - o establishing the oversight system for the operator and emptier services.
 - o starting the checks and supporting City of Niamey personnel for the first fiscal years.

And, to cope with the STBV's start up problems:

- Technical assistance for the national operator, with the following main missions:

³⁶ The Consultant has met with SEEN who recognizes that collection of this fee is in accordance with its leasing contract.

- take part in the provisional acceptance of the structures, identify and clear any reservations where applicable and take part in the final acceptance,
- put in place emptying arrangements so that emptiers will always be able to discharge when they come and will not have significant waiting time at the station entrance,
- put in place operating procedures appropriate to the actual functioning of the STBV on the basis of the vendor's procedures and ensure that personnel are properly acquainted with these procedures,
- optimize the STBV's output and propose the measures to put in place by City of Niamey or emptiers to improve the quality of fecal sludge at the entrance to the station,
- define and put in place KPIs and a reporting system for monitoring the functioning of the STBV,
- put in place a quality control system for the sludge and residual water after treatment, based on daily and quarterly analyses.

Two options can be envisaged for the recruitment of the operator's technical assistance:

- Include it in the operating contract, which would have the effect of significantly increasing its cost³⁷, with, of course, an impact on the fecal sludge treatment fee, even if the technical assistance should only last a year. In this scenario, the formation of consortiums between an international operator or an operator of the sub-region and a Nigerian operator (open national invitation to tender), should be preferred in the invitation to tender.
- Recruit technical assistance independently of the national operator to support it during the first year of station operation, which would avoid affecting the cost of the contract. If this option is chosen, this technical assistance should be recruited in parallel to the operator since it is required right from the start of the contract (acceptance of structures, training by the vendor, etc.). It should therefore be possible to prepare and put out the invitation to tender for recruitment of this technical assistance in parallel to that for the recruitment of the operator.

As mentioned, these two types of technical assistance (to City of Niamey and for operation) should last only one year at the start of activity. In terms of startup help, it seems justified that their financing should be sought from the lenders already present in the sector and able to rapidly raise the funds necessary.

During the workshop meeting to validate this report, it was agreed that the technical assistance to City of Niamey would be financed and recruited by City of Niamey and that the technical assistance to the operator would be recruited in parallel to the future STBV operator. However, the financing of this second technical assistance remained to be validated.

³⁷ *Technical assistance should include at least an STBV manager with experience of operating similar STBVs. This manager will therefore be an expat, probably from the sub-region, but at a high cost compared with the cost of the operating contract. The financing of this contract by the operator represents considerable expenditure the first year, which will come in addition to the expenditure related to the acquisition of operating goods. This would require borrowing capacity difficult to expect.*

5.2 Provisional schedule for the recruitment of the operator

5.2.1 Measure prior to the launch of the invitation to tender process

Before anything else, the invitation to tender procedure must be initiated by a general notice of publication sent to the ARMP and a forecast plan of tendering for public procurement contracts with the purpose of informing the public of the contracts that the contracting authority plans to put out during the year. The forecast plan should be officially published in the "Journal des Marchés Publics" (public procurement contract bulletin) on 31 January of the current financial year, at the latest.

Regarding **the invitation to tender for the recruitment of the operator**, it had not been sent to the ARMP last May and that was mentioned in the startup report for this study. If this has not changed, it is urgent to take the measures to revise the forecast plan and register the contract for the recruitment of the operator with the ARMP immediately, to avoid delaying the recruitment process when it is started.

We consider here **that the technical assistance to the STBV operator** for the first year will be financed by the technical and financial partners and will therefore not be subject to the national public procurement contract code. However, if this were not finally the case, it would be necessary to register this procurement contract at the same time as the contract for the recruitment of the STBV operator.

Finally, the contract for **technical assistance to City of Niamey** could be registered in the 2018 procurement plan and started at the beginning of the year by City of Niamey departments.

5.2.2 Possible schedule for the invitation to tender process

The end of the construction of the STBV was initially planned for 20 July 2017. An amendment is being drafted at present, concerning the performance of additional work for the construction of the drying shed, the storage warehouse and the irrigation system for watering the hedge, the extension of the electricity line and the enclosure of the site. This work will entail longer construction times and the end of the work would be planned for December 2017. Consequently, that leaves only 5 months from the beginning of August for recruiting an operator if it is wished to recruit one at the end of December to be operational from the beginning of the year to take part in acceptance of the work.

Below, we present a schedule with comments for the invitation to tender process, based on reasonable times for approval of invitation to tender documents and contractual documents on the one hand (August 2017), and the provisions of decrees no. 2016-641 of 1st December 2016 and no.2013-569 of 20 December 2013 forming the public procurement contract and public service delegation code, on the other.

This schedule is based on relatively optimistic assumptions:

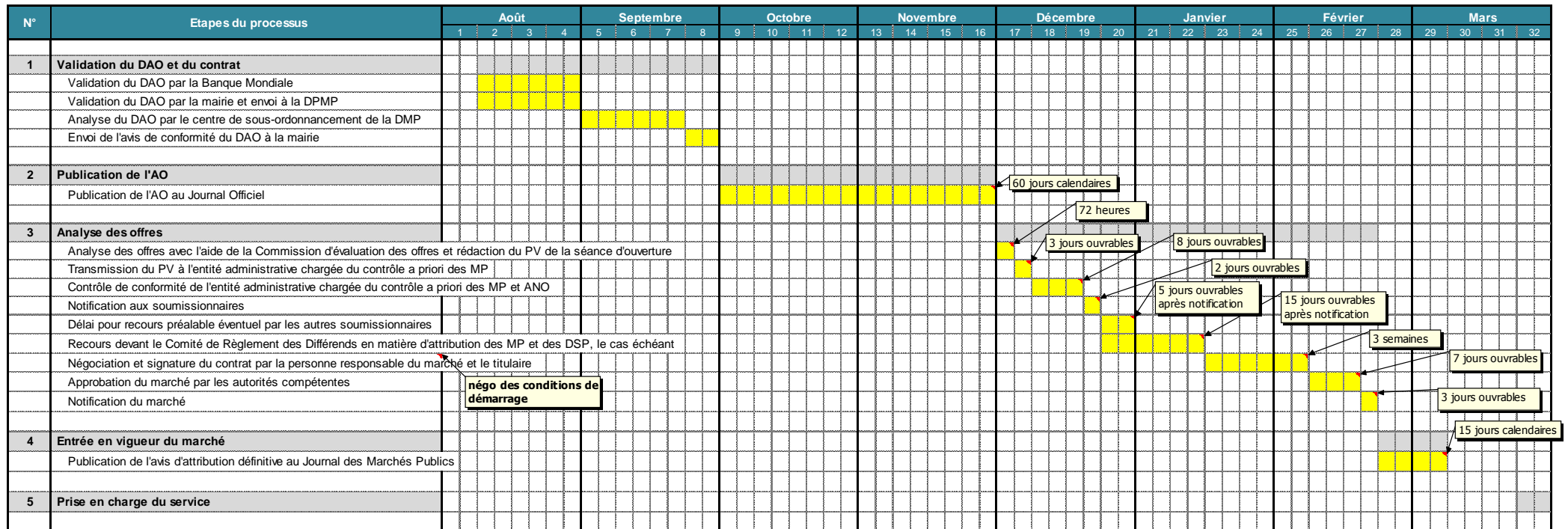
- Invitation to tender put out by City of Niamey on the 1st September, after approval of the DAO and the draft contract,
- Two month tender preparation time left for tenderers. This time includes a tenderer question/answer phase during which tenderers can submit requests for changes in certain aspects of the DAO, both in terms of invitation to tender rules and in the draft contract. These comments will be taken into account in a final version of the documents provided for tenderers at least three weeks before the submission of tenders. Tenderers will prepare their tenders on this basis, given that there will not be any possibility of

negotiating the draft contract by the successful tenderer, in order to avoid any delay in the operation startup date.

- Compliance with the minimum times set by the public procurement contract code regulatory framework,
- No negotiation phase before the contract is signed.

This schedule takes us to an entry in force of the contract with the publication of the final letter of allotment in the Journal des Marchés Publics, at the earliest in mid-March and therefore the takeover of the service at best at the end of March, nearly three months after the forecast end of the work.

Figure 12: Provisional schedule for the invitation to tender process



5.2.3 Risks and recommendations

The end of the works being planned for December 2017, the provisional acceptance of the station, attended by the future operator and vendor, should in theory take place at the latest in the beginning of January 2018.

Given the possible timescales envisaged (as presented in the schedule above) which are relatively optimistic, this already leads to an overrun of around three months in the forecast acceptance date of the structures, a date on which the operator's presence is vital to take over operation (accept the structures and be trained by the vendor).

This being the case, it seems sensible to envisage in addition the possibility of an extension in times during the invitation to tender process, whether at the tenderers' request for the preparation of their tenders or at the different approval stages (assessment committee, control by public procurement contracts, appeal by a tenderer, etc.).

Given the difference between the forecast work completion date and the possible date of operation start up by a private operator, it is recommended that it should be checked right now whether it is possible to negotiate an amendment of around 3 months (possibly renewable) with the vendor for the latter to conduct station operation for the first few months until the operator arrives. Provisional acceptance could then be postponed and take place in the presence of the vendor and the operator.

Another risk that should be considered is that of an unsuccessful invitation to tender. There too, the only solution to be envisaged would be to negotiate an amendment with the STBV vendor for them to start operation while waiting for the operator to take over the service. In that case, it would be preferable to draw up an amendment for a period of a year minimum, the time needed to analyze the reasons (technical requirements, inaccuracies, etc.) leading to the unsuccessful invitation to tender, revise the DAO and draft contract accordingly and restart the invitation to tender process.

5.3 Main lines of the DAO revision

5.3.1 Applicable law

Firstly, it should be mentioned regarding the DAO, that the fiscal year is constrained by the provisions of decree no.2016-641 of 1st December 2016 modifying decree no.2013-569 of 20 December 2013 forming the public procurement contract and public service delegation code (article 77) which sets out its composition. This article stipulates that:

The invitation to tender file consists of:

- the invitation to tender notification;
- instructions to tenderers (IC in French);
- special invitation to tender data (DPAO in French);
- general administrative clauses (CCAG in French) ;
- special administrative clauses (CCAP in French);
- general technical clauses (CCTG in French) for works contracts;
- special technical clauses (CCTP in French) or technical specifications;

- the forms.

Standard files are defined by the public procurement regulation agency and their use is mandatory.

The contracting authority can only modify the invitation to tender file in exceptional circumstances not affecting the contract's substantial conditions.

Invitation to tender file modifications, with the exception of those affecting the specific provisions of the rules for invitations to tender, the administrative clauses and the technical clauses, must comply with this code and be submitted for prior approval, to the administrative entity responsible for the preliminary check of public procurement contracts. A report of all modifications is drawn up by the person responsible for the contract and appended to the invitation to tender file.

Modifications of the invitation to tender file are passed on to all tenderers at least ten (10) calendar days before the tender submission date which can, in this case, also be extended by the contracting authority.

5.3.2 Structure of the present DAO

In the light of the above, it should be mentioned firstly that in its form as drafted at present, the DAO does not seem to meet the requirements of article 77.

Secondly, the 3rd paragraph of this article allows modifications in *exceptional circumstances not affecting the contract's substantial conditions*. However, it is not certain that the conditions for "exceptional circumstances" are met here.

As it stands, the DAO consists of three parts made up of the following sections:

1st part: Invitation to tender procedure

- Section I: National invitation to tender notification
- Section II: Instructions to tenderers
- Section III DPAO
- Forms

2nd part: Conditions for performance of the public service delegation agreement

- Section IV Detailed functional program and technical clauses

3rd part: Agreement

- Section V: Agreement clauses
 - o *Part A*: Purpose, contents and description of the elements of the public service delegation
 - o *Part B*: Content of the public service delegation agreement

Appendix Leasing contract of the fecal sludge treatment station of Koubia/Niamey

The **1st part** does not call for any particular comments regarding its structure. However, the wording should be altered in the revised version to take account of the fact that the invitation to tender no longer concerns public service delegation but a provision of service containing specific terms and conditions of remuneration in addition.

It is in this 1st part that it will have to be specifically mentioned that the awarding of the "contract" will imply the obligation for the tenderer awarded the contract to sign the contract and its appendices contained in the DAO (and it will therefore be a contract of adhesion).

In the 2nd part, the document entitled "Programme Fonctionnel Détaillé et Cahier des Charges Technique" (detailed functional program and technical specifications) is a mixture. It contains administrative provisions and technical provisions. In our opinion, it should be broken down and the following drafted:

- a document replacing the CCAG, for the administrative part;
- a document replacing the CCTG, for the technical part;

As regards the CCAG, which is a requirement, it will have to be adapted using the CCAP, taking care that the principles used are in line with those underlying the operating contract which will be included in the DAO.

As regards the CCTG and the CCTP, it is proposed that it should be the draft contract and its technical specifications which serve as the CCT. These documents set out all the principles and the contract holder's technical obligations.

In the 3rd part, the current document entitled "Cahier des Clauses de la Convention" (agreement clauses) is confusing. It contains repetitions in terms of the administrative part of the detailed functional program. As written, it seems to be a guide to the drafting of an invitation to tender file rather than an invitation to tender document as such. In our opinion, it could impair understanding of the system as a whole by tenderers. It is proposed that it be removed.

5.3.3 Proposals for the structure and organization of the DAO

5.3.3.1 Choice of standard document

It will be remembered that the purpose of the public procurement contract put out to tender is the operation of the STBV by a private operator (Operator) on behalf of City of Niamey. The services required from the Operator under this contract are essentially operational (reception of sludge, sorting, drying and handling of dried sludge, monitoring of the effect of operation on the environment (control of effluents, quality of sludge, etc.), and all upkeep of the station. More incidentally, the Operator will be bound by administrative and accounting obligations related to the operation of the STBV.

Decree no.2016-641/PRN/PM of 1st December 2016 forming the public procurement contract and public service delegation code distinguishes and defines three types of contract:

- works public procurement contracts;
- supply public procurement contracts;
- provision of service public procurement contracts.

The category of works public procurement contracts obviously does not apply to the contract to be signed for the operation of the STBV and can be quickly dismissed.

The question remains as to the most suitable type of contract.

In general, public provision of service procurement contracts are defined by the 2016 decree as follows: a contract [which] is neither a works contract nor a supply contract. Its main purpose is the provision of routine services or intellectual services.

Intellectual services are defined as follows by this decree: services which consist mainly of studies, research, consulting, engineering or assistance which do not translate into a physically measurable or apparent result.

In its preface, the standard invitation to tender file (DTAO) for intellectual services stipulates that it can apply to: contracts with a large part of services based exclusively on intellectual activities. These may be studies, analysis, design, assessment, technical assistance or even project ownership or management. In this case, the STBV contract is a contract containing essentially manual labor requirements for sorting and handling. It does not contain a secondary or minor part of services requiring intellectual activities (monitoring and control).

The main purpose of the operating contract is indeed the treatment of physical quantities of material. However important they may be, the services of control and oversight are only incidental. It is in fact the Operator's capacity to deliver visible measurable technical results that is expected by City of Niamey and these results will be measured specifically according to the volume of sludge received, the quantity and quality of dried sludge, the quality of the effluents discharged into the natural environment, etc.

The "intellectual service" DTAO therefore does not fit the STBV operation contract.

The "supplies and related services" DTAO therefore remains.

This DTAO seems to correspond better to the type of procurement contract.

Firstly, as mentioned above, given its nature and content, the contract in question is firstly a provision of service contract. In accordance with the 2016 decree, it is neither a works contract, nor a supply contract (the only supplies concerned would be the operating equipment provided by the Operator).

Moreover, the "supplies and related services" DTAO also applies to services which are not related to supplies. The CCAG defines "related services" as: the related services connected with the supply of goods such as insurance, installation, training and initial maintenance, as well as any similar obligation of the contract holder under the contract *OR services provided as the main purpose of the contract*. In this case, it is certainly a service contract and the services provided by the Operator will in fact constitute the main (indeed the only) purpose of the contract..

Finally, it is important to note that the "supplies and related services" DTAO has obvious practical advantages, insofar as it covers a wide range of services (supplies and supplies AND services, or services ONLY), and its drafting can therefore be flexible enough to adapt it to the circumstances of the STBV operating contract.

5.3.3.2 Structure of the standard document

The structure of the "supplies and related services" DTAO is the right one and the plan chosen for the DAO will therefore be as follows:

First part – Invitation to tender procedures

Section I. Invitation to tender notification

This document does not call for any particular comments and will be adapted.

Section II: Instructions to tenderers (IC)

This section provides tenderers with the information necessary to prepare their tenders (information on submission, opening of the tenders, assessment of offers and awarding of contracts). *The provisions contained in this section must not be modified.*

Section III. - Specific invitation to tender data (DPAO)

This section sets out the provisions specific to each procurement contract which supplement or modify the information or conditions contained in Section I, Instructions to tenderers. It will therefore be adapted.

Section IV. Submission forms

This section contains the templates of the forms to submit with the tender: the submission letter, price lists, the bid bond and the vendor's authorization. These documents can be adapted according to the requirements of the invitation to tender

Second part – Conditions for the provision of supplies and related services

Section V. List of quantities, Delivery schedule, Technical Clauses techniques, Plans, Inspections and Testing.

This section contains a list of supplies and/or related services, the schedule for delivery and completion of the general and specific technical clauses, the plans describing the supplies and/or related services to be provided, etc. Since this section can be adjusted, the forms will be tailored to tender assessment needs and the draft specifications (appendix 4 of the draft contract) will serve as the technical clauses.

Third part – Contract

Section VI. General administrative clauses (CCAG)

This section contains the general provisions applicable to all contracts. The wording of the clauses of this section should not be modified.

Section VII. Specific administrative clauses (CCAG)

This section sets out the clauses specific to each contract and will therefore be adjusted to be consistent with the corresponding clauses of the draft operating contract.

Section VIII. Contract forms

This section contains the contract form which can be modified. It will therefore be replaced by the draft operating contract.

Where applicable, the performance guarantee and early repayment guarantee forms, shall be completed only by the tenderer chosen after the contract is awarded and approved (the contract holder).

5.4 Main lines of the draft contract revision

5.4.1 Nature of the contract

Basically, the proposed contract is therefore no longer a lease contract.

In the case in point, because of the actual circumstances and the economic environment surrounding the project, a lease contract in the strict sense of the term cannot be envisaged.

In such a contract, the lessee would be remunerated directly, at their exclusive risk, through a "fee for service provided" levied on users, on the one hand, and it would give rise to the payment by the lessee to the leasing authority of a sum referred to as the "lease contract surcharge", on the other, which would remunerate the cost of the capital entrusted to the lessee.

As mentioned above, the sums paid to the operator of the station by its users (emptiers) are not enough by themselves to ensure that the system breaks, still less enable the operator to pay City of Niamey a "rent" corresponding to the use of the infrastructure. This state of affairs has considerable repercussions on the description of the contract.

In this respect, article 52 of decree no.2013-569/PRN/PM of 20 December 2013 forming the public procurement contract and public service delegation code amended by decree no.2016-641/PRN/PM of 1st December 2016 forming the public procurement contract and public service delegation code (now article 54) stipulates that:

The government and regional authorities can delegate the management of a public service to a concession holder whose remuneration is, for the most part, related to the results of the operation of the service. Public service delegation concerns the building and operation of public structures and network operation and is carried out in the form of a state-owned profit-sharing company, lease contract and/or concessions. (Editor's note: our underlining)

Thus, insofar as the remuneration of the STBV operator will not be, in our case, linked "for the most part" to the results of station operation, it does not seem possible to describe the delegation system as a public service.

It is therefore, rather a public services contract. However, this is a slightly special contract. The contract holder will not be paid only through a price paid by the authority as in a conventional contract, (here, the fraction of the fecal sludge treatment fee which will be transferred to them by City of Niamey). The contract holder will also receive the income from the discharging fee, paid by users (emptiers). The amount per unit will be decided by the Town.

Therefore, the drafting of the DAO, the contract and the technical specifications will be amended accordingly, insofar as the notion of public service delegation cannot in our opinion be used.

Furthermore, it will be remembered that, where applicable, the contract holder can also be remunerated on sales of agricultural standard sludge, effluents suitable for irrigation and other materials and by-products from STBV operation to third parties.

5.4.2 Contract structure and contents

The contract maintains a conventional structure. In this respect, City of Niamey is already familiar with the structure used here, based on that used for the contract signed between the Republic of the Niger, SPEN and SEEN for potable water (20 March 2001).

This structure is nevertheless suited to the case in point since, as seen above, it is not strictly speaking a lease contract but a service contract (see 5.4.1 above).

As regards contract content, the duration is reduced to 5 years initially. It could be renewed for a period to be determined between the parties and, where applicable, if the conditions stipulated by decree no.2016-641 are fulfilled, through a negotiated contract, or failing that through a further invitation to tender.

As regards the technical obligations, they are no different from what they would have been in a lease contract in terms of technical and environmental performance.

The financial stipulations are revised as presented above concerning the terms and conditions of the contract holder's remuneration.

The general functioning of the contract and the powers of the delegating authority remain essentially unchanged.

On the other hand, once it no longer concerns a lease contract, the contract holder's infrastructure maintenance obligations are limited to routine maintenance and minor repairs. Major repairs and infrastructure renewal costs remain the delegating authority's responsibility.