

A Work Project report presented as part of the requirements for the Award of a joint Master's Degree in Finance and International Management – CEMS from NOVA School of Business and Economics.



Introducing an Asset Life Revaluation Component to the Harmonized Cost Matrix for Municipal Waste Management

A Work Project carried out under the scope of the CEMS – Masters in International Management Business Project, in partnership with Sociedade Ponto Verde – SPV and Entidade Reguladora dos Serviços de Águas e Resíduos – ERSAR

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1 Business project overview – Harmonized Waste Management Cost Matrix

1.1 Companies assessment – Sociedade Ponto Verde and ERSAR

The first and most important company for the unfold of this project is Sociedade Ponto Verde (SPV), a Portuguese Non Profit Organization (NPO) established in 1996 to promote and manage the selective collection and sorting of packaging waste in the Portuguese *Green-Dot System*¹, i.e. the recycling eco-system, described in appendix 1. Hence, SPV does not directly recycle waste but rather promotes, both from a financial and educational standpoint, the selective collection and sorting from municipal companies, for a later re-selling to recycling companies, at the end of the cycle. The second partnering entity involved in this BP is the Portuguese Water and Waste Management Services Regulator (ERSAR²). ERSAR's role in this project was to develop a deep understanding about the mechanics, risks and possible outcomes that this BP's harmonized waste management cost matrix would have on the recyclable side of waste management, to later apply it throughout the entire waste management system, encompassing both recyclable and non-recyclable waste flows.

1.2 Problem statement

One of SPV's main contributions to the system is to financially pay an annual fee³ for the selective collection and sorting of packaging waste. This happens due to the fact that the activities that both processes encompass, from a recycling standpoint, imply a much higher cost than traditional waste management services, focused at collecting and incinerating undifferentiated waste. Hence, in order to put the system to work, SPV has to financially incentivize the Portuguese municipal waste management companies (SMAUTs⁴) to develop its collection and sorting activities. This BP tackles a key problem of this system: the current network of 23 SMAUTs that take part in this system have different processes, equipment and therefore cost structures, and the model through which SPV currently estimates their activity costs does not account for this issue. Hence, SPV acknowledged the need to create a new system that takes into

¹ From the Portuguese translation of SIGRE – Sistema Integrado de Gestão de Resíduos e Embalagens

² In Portuguese, Entidade Reguladora dos Serviços de Águas e Resíduos

³ In Portuguese, Valor de Contrapartida (VC) – financial reward based on the amount of recyclable waste collected and sorted and its associated costs

⁴ From the Portuguese Sistemas Municipais e Autarquias (SMAUT) Aderentes ao Sistema Ponto Verde

consideration the existing differences, but allows for a harmonized calculation and comparison of costs on an activity basis. Ultimately, this will promote efficiency across the system, through the sharing of best practices and knowledge, and create the correct financial incentives for companies to effectively perform. Therefore, the ultimate goal for this BP is to develop an harmonized cost matrix model, through an activity-based perspective⁵, to correctively trace the costs per activity, across the entire system, and allow SPV to perform better as the system's manager, as seen in appendix 2.

1.3 Project development and final conclusions

The final outcomes of the BP are an excel cost matrix tool, an Implementation Plan (appendix 3) and a User Manual (appendix 4), developed alongside with SPV and ERSAR, that is built using a simple top-down rationale approach to cost allocation, as depicted in appendix 5. The goal is to create a cost allocation tool that enables users to trace costs per process, waste flow, activity and ultimately material. The excel cost matrix tool encompasses three major areas, namely *identification* of costs, *allocation* according to flows, processes and materials, and lastly a *calculation and results* section, in which the final costs are displayed for analysis and benchmarking, as seen in appendix 6. The final model results in a set of 38 excel sheets, grouped according to the type of waste flow that the costs are incurred in, whose structure may be seen in appendix 7. Although the final goal of this BP may be seen as potentially *easily* addressed, a substantial number of issues made the development of this model quite challenging, with an interesting number of risk areas, depicted in appendix 8. The fact that there is not enough information to apply a typical activity-based project, alongside with difficulty of building an harmonized model through an inherently tailored activity-led perspective, whose benefits can only be unfold if the model is tailored to every specific organization, were obstacles to overcome. The results of this BP are only the first step. Both SPV and ERSAR will now ensure further validation, legal compliance and any required minor fine-tuning needs, for a successful and wide adoption across the waste management system.

⁵ Based on Activity-Based Costing (ABC) theory. For further information please check the BP report and/or its references.

2 Introducing an Asset Lifetime Revaluation Component

One of the expenditure components that SPV takes into account when computing the total cost that each municipal waste management organization incurs in to perform both selective collection and sorting activities is Capital Expenditures (CAPEX), as seen in appendices 4 and 5. Within this area, depreciation and investment costs account for a large stake of the total expenses, as these activities are quite capital intensive. When the BP team visited one of the sorting stations operating within the region of Lisbon, *Valorlis*⁶ it came to the group's attention that some of the machinery and equipment were already *fully depreciated*. Having in mind that the model we created in the BP calculates total costs on a segmented basis, it becomes apparent that when some of the machines are fully depreciated, but still in use, the capital expenses component of total costs are not being considered. Therefore, these costs are *undervalued*. This can hinder SPV's objective of increasing the overall efficiency and sustainability of the system. Thus, I have chosen this area to develop my individual work on, as improvements in this will lead to a better model, taking in consideration these currently non-considered potential extended depreciation expenses and their impacts for SPV, the SMAUTs and ultimately the National waste system.

2.1 Initial approach

Despite the fact that the group realized the existence of this accounting loophole, as detailed in the aforementioned section, we could not solve it in time for the final report. In fact, although it would inevitably become interesting to analyze new ways to account for this lack of transparency within the new developed model, the group's prioritization of tasks demanded this issue to be left to a latter improvement stage. The aim was to develop the basic rationale and pillars for the initial model, and this issue was left for further research. Nevertheless, when the time comes for the entity to replace the fully depreciated item by a new one, the depreciation charges increase and may have a significant impact of the assessment of the efficiency and performance.

Additionally, it is important to note that while this lack of transparency situation is not positive for the system's long-term performance, it was explained to us that the large

⁶ For additional information visit Valorlis corporate website - <http://www.valorlis.pt/>

majority of the national SMAUTs network was operating under the same standards, which means that the outputs resulting from the new model are still comparable.

2.2 The relevance of this topic

2.2.1 **Current situation**

In the current model that SPV uses to estimate the total cost of collecting and sorting to each of the three flows, namely yellow, blue and green, as seen in appendix 10, the accounting depreciation expenses are based upon general straight-line depreciation estimates, that are applied to all SMAUTs within the waste management network according to the type of machinery or equipment⁷. This depreciation allocation rationale means that regardless of the operational lifetime of a given asset, the cost computation model will always account for the same proportional expenses, which opens the door to potential accountancy errors, as seen in the introduction to section 2. Furthermore, these assumptions translate into generalized expenses that might not be in line with the real-life operational expenses that the SMAUTs incur in to perform their activities, and further difficult the operational performance assessment and benchmarking.

2.2.2 **Legal perspectives and solutions for fully depreciated assets**

I now assess the legal perspectives of this topic, in line with the International Financial Reporting Standards (IFRS). According to *International Accounting Standard 16 – Property, Plant and Equipment* (IAS 16⁸), entities should review their assets' useful lives *at least* at each financial year-end⁹. Thus, situations where fully depreciated assets are still being used should not exist. As organizations revise their assets' useful lives the value of annual depreciation also changes (as the same cost is now allocated to a different number of years). This affects the total costs of the entity (through depreciation charges), therefore impacting the year-end financial performance through higher depreciation costs, as well as common ratios usually calculated for the assessment of performance such as Return on Assets (ROA), as the value of total assets is changed.

⁷ From Anexo 4 – Modelo de Apuramento de Valores de Contrapartida (VC), pp. 24-25 (SPV)

⁸ For further information please visit <http://www.iasplus.com/en/standards/ias/ias16>

⁹ IAS 16.51 (Depreciation) – “*The residual value and the useful life of an asset should be reviewed at least at each financial year-end and, if expectations differ from previous estimates*”.

Hence, while the concrete retrospective impact of this lack of accuracy in accounting should be measured according to the *material impact* definition considered in IAS 8¹⁰ - *Accounting Policies, Changes in Accounting Estimates and Errors*, there are two possible solutions to solve this problem prospectively, according to these international standards. The first, the *application of a revaluation model*, encompasses a large-scale shift in accounting policies, as measuring the assets at their fair value according to IFRS 13¹¹ - *Fair Value Measurement* allows the corporations to consistently revalue their assets. Nevertheless, this is a very difficult, painful and quite impractical approach to solve this problem, specially taking into account the reality of the Portuguese waste management system, where coordination and supervision are still quite undeveloped. It would be necessary to change the current accounting policies for entire system, which is not feasible in the foreseeable future. As for the second option, this much simpler approach considers the *review of the useful life* at least at the end of each financial year, according to what is required by IAS 8.36¹². To do so, corporations are only required to take their net carrying asset value, net of previous depreciations, and simply divide it by the reviewed estimated useful life, therefore extending the depreciable life of the asset. While this requires a one-time painful asset review from corporations, it allows them to be in line with the international legal standards and unfold an interesting set of benefits for supervision.

2.2.3 Benefits and importance of modeling for this accounting loop

For this project's purpose, the key benefits from modeling this accounting error should be seen in a twofold approach. The first is concerned with *transparency and accuracy*. By requiring the entities to accurately measure their assets lifetime usage, and therefore depreciation, the result is an increased trustworthiness in financial accounting, in light of what is required by the IFRS standards. As for the second, it is based upon the notion that accounting for the real asset lifetime in this model allows SPV to have *better inputs*

¹⁰ IAS 8.41 (Errors) – “(...) an entity must correct all material prior period errors retrospectively in the first set of financial statements authorized for issue after their discovery (...)”. For further information please check – <http://www.iasplus.com/en/standards/ias/ias8>

¹¹ For further information please check – <http://www.iasplus.com/en/standards/ifrs/ifrs13>

¹² IAS 8.36 – “The effect of a change in an accounting estimate shall be recognized prospectively by including it in profit or loss (...)”. For further information please check <http://www.iasplus.com/en/standards/ias/ias8>

for computing the SMAUT's financial compensations. Increasing the quality of the necessary data gathered for this model will allow SPV to better estimate the financial compensation for capital expenditures accounted in the model. Furthermore, an interesting number of assets seem to be kept in use while fully depreciated, which means that by extending the life of these assets, the municipalities would potentially get a financial compensation that otherwise they would not receive.

2.3 Implementation

2.3.1 Mechanics of the proposed revaluation tool

While the two proposed solutions in section 2.2.2 would tackle this same problem in distinct ways, it is important to note that in the context of this BP, given the constraints and risk areas depicted in appendices 8 and 9, the proposed Asset Lifetime Revaluation Tool for this project does not fully mirror any of the aforementioned solutions, but is more factually based in the *asset lifetime estimation* solution. In line with the entire rationale developed for the BP, this tool is based in a new excel sheet that requires the model's users to input their current asset economic lifetime (as in their books), and then to input the estimated remaining lifetime, to then compute the *real* depreciation charge that the model should take into account, to make it as trustworthy as possible. In fact, by doing this, the model's performance should be further increased, as the data regarding capex charges become aligned with reality. A simple illustrative example of this tool's mechanics is detailed in appendix 13.

2.3.2 Expected outcome

It is important to consider several outcome scenarios, with the three main types of depreciation expense currently existing, namely the *fiscal* depreciation (concerning tax purposes) *accounting* depreciation (the one accounted for in financial accounting) and the *real* depreciation, which is ultimately what I am interested in for this Work Project's (WP) development. Nevertheless, for this WP's purpose, the most interesting case to consider is the one where the accounting depreciation is lower than the real depreciation charge, a situation in which the asset's accounting depreciation lifetime is being *undervalued* in relation to the real lifetime, as seen in the example displayed in **appendix 12**. Considering this case, it is important to highlight the main expected impacts that extending the asset's depreciation lifetime would have on the three main

entities in the system, i.e. SPV, the SMAUTs and the Waste Management System (see **appendix 13**):

- **SPV:** As this tool gets progressively implemented BP model, SPV will have increasingly trustworthy operational data from the SMAUTs, assessing their assets real-life performance throughout their useful lifetime, therefore paying accordingly. Furthermore, it will allow SPV to use this data for better benchmarking and best practices sharing among peer municipal companies, increasing the system's cost efficiency.
- **SMAUTs:** For these entities, this tool's implementation is expected to unfold a dual effect. If on the one hand the incremental increase in the asset's depreciable lifetime would translate into an expected higher financial compensation through a longer period of time from SPV, on the other hand this accounting error acknowledgement would inevitably translate into the need to record extra depreciation expenses across the several financial accounting reports, such as B/S and I/S. It should not be possible to hold two different accounting standards for two different reporting situations. Hence, the dubious outcome effects for these entities would require the regulator's attention to ensure their cooperation and disclosure of information for this matter, setting up the right incentives for the latter to behave accordingly to expected..
- **Waste Management System:** The increased capex expenses transparency, trustworthiness in accounting, opportunity to benchmark SMAUTs and ultimately promotion of a meritocracy through the sharing of best practices, would have a tremendously positive impact on the system's sustainability and development on the medium to long term.

2.3.3 Risks

Alongside with what was mentioned in the BP report delivered to SPV/ERSAR and displayed in appendix 9, there are a number of risks from adopting this model, and specifically this new tool. Firstly, the *quality of inputs* cannot be guaranteed, as there is currently no mechanism to audit the figures and data entered by the SMAUTs. This feature gets additional importance with this revaluation tool if one considers the dubious effect that increasing the lifetime of the assets would have on the SMAUTs, as seen in the previous section, so it is key to have this as a reference. Secondly, it is necessary to

ensure that the end users are *educated and get acquainted with this new model* and approach, not only because the model is not based on regular accounting models, but also due to the fact that in order to estimate the extended asset lives, accounting managers should possess sufficient knowledge surrounding IFRS, namely IAS 8, as mentioned in section 2.2.2. Thirdly, the inexistence of a common asset lifetime *measurement* process, to estimate the future usefulness of the assets, means that different entities can measure their assets lives in different ways, therefore jeopardizing the system's comparability features.

2.3.4 Future areas of research and improvement

As a reference for future research, this WP's assessment suggests three key areas of possible further investigation. Alongside with what was suggested in the aforementioned risks section, the first future research area is related with the need to find innovative ways to ensure that the inputs displayed in the model developed in the BP are factual and in line with reality, as there is currently no mechanism to audit the numbers without a double check from auditors or regulators. Furthermore, the inexistence of a procedure for evaluating the prospective asset lifetime usage with this new tool will push practitioners for further research. In fact, two different entities may have different expectations with regards to their assets lives, which is why it is not only important to cope with the possible increased life expectancy, which this WP already assesses through this add-in, but to model those expectations through a common procedure to ensure the necessary comparability feature. These expectations should be in line to what is required by the International Accounting Standards, as mentioned in previous sections of this report. Lastly, the expected positive impact that both the model developed in the BP and this additional tool will have in the Portuguese waste management system must be measured and tested, both quantitative and qualitatively, to allow further improvements. The lack of compatible information for the new model developed and testing in the BP was a crucial pain-point, as discussed with SPV and ERSAR throughout the meetings, and this tool's quantitative testing faces the same problem. The fact that the model is not exactly compatible with traditional financial accounting reporting, alongside with a sense of reluctance from the SMAUTs to cooperate with information gathering for this WP and the BP itself are interesting points for future research and incorporation.

3 Reflection on learning

3.1 Previous knowledge learned from MSc. In Finance

Having as a reference that one of the core areas of study that my Masters focuses upon is in understanding how financial accounting represents and impacts companies' performance and therefore valuation, I believe the application of my previous knowledge in this BP can be summarized along the following dimensions. The first is that *analytical accounting is key for effective operational performance*. In fact, when thinking about how to develop the proposed cost matrix in a way that contributes for an effective operational improvement across the national recyclable waste management system, it was interesting to see how valuable and real-life applicable the lessons learned in courses such as Financial Statement Analysis (FSA) or Financial Accounting (FA) were. As for the second dimension, it concerns the fact that *success it is always about putting in place the right set of performance incentives*. The notion that success in corporations can only be achieved through an effective full alignment across the main actors involved in a given project, as learned in courses such as Applied Corporate Finance (ACF), Private Equity (PE) or Venture Capital (EFVC), was applied in the context of this BP across several areas, namely when thinking about the implementation plan across the national systems network. Lastly, the remaining and probably most important dimension is that *team working is crucial*. Having as an experience that the MSc. In Finance demanded quite a lot of team effort in order to fulfil all the required assignments, it was definitely worthwhile for me to step in as a leader in my BP team and promote the team spirit, commitment and effort, that is required to complete such an interesting and yet challenging assignment as the one this BP presented.

3.2 New knowledge Developed

Regarding new concepts and knowledge developed, I believe this real-life project improved my skills portfolio in two bold areas. The first and most obvious one refers to excel modeling. Having as a background that the core of this BP was to develop an excel tool, I was faced with the need to develop my modeling skills, in a way to structure the rational of the final model in the most easy and client-friendly way. Regarding the second area, I believe the greatest improvement that I made throughout the entire project refers to team working and bonding the several parties involved in the BP to one common sense of agreement. In fact, dealing with the companies' BP

objectives and staff, the academic advisor mentoring and guidance, and the team's innovative solutions to develop one common solution that pleases all parties was not always an easy task. Hence, I was lucky to develop new interaction capabilities that will most certainly help me throughout my professional life.

3.3 Personal Experience

Regarding my experience with this BP, it is important to highlight not only the strengths but also the personal weaknesses. Regarding the first, I would say that my clear focus on the final goal, the team working spirit and communication and the persistence with being outstanding in every aspect of the BP were the most important points to consider. As for the weaknesses, I would humbly acknowledge that being too focused in putting increasingly more workload to myself, and sometimes being too critical towards the outcomes across the several stages of the BP were the main pain points for improvement. Nevertheless, after a peer evaluation meeting that I had with the BP group, proposed by myself, I was given feedback from my colleagues to improve my delegation skills, which is what I will work for in the upcoming future, as the beginning of my professional life is about to begin.

3.4 Benefit of hindsight

Looking back at the key points achieved and developed throughout the course of this BP, I would say that the topic that added most value to the project was the innovativeness of our approach. In fact, the result of the BP is a completely new cost-allocation procedure that combines Activity-Based Costing (ABC) theory application with the group's unique experiences across different university courses, professional experiences and own insights. Nevertheless, while it is interesting to see what will be the results of adopting this model, it is also crucial to account for the possible loops that might not yet have been taken into account by our BP group. On the other side, one of the key errors that the group and SPV/ERSAR humbly acknowledged at the end of the project was not inviting one or more municipal waste management companies to work alongside with the team to develop the proposed cost allocation model. These entities seemed to display a somehow non-cooperative towards this project and the parties involved, as it will inherently have an impact on their future operational performance. Nevertheless, given that these are the ultimate users of the new model, it would have been interesting to see their input.

4 References List

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- Reyhanoglu, M. (2004). *Activity-Based Costing System. Advantages and Disadvantages* [Ankara University – Institute of Social Sciences]

5 Declaration

I confirm that this paper is solely my own work. Although partially based on the Business Project under the scope of the CEMS – Masters in International Management (MIM) Program developed alongside with an international team that was part of, this Work Project has not been previously submitted for assessment, published or quoted.

All material quoted throughout this report is accurately indicated as such, and I have acknowledged all sources that served as a basis for the development of the present report employed fully and accurately, as required.

As so, I agree with a plagiarism check of this Work Project. Furthermore, I am completely aware that failure to comply with such requirements is a natural breach of rules and the School's code of conduct, and could result in resubmission, loss of marks, and/or further disciplinary action.

Lisbon, 23th of May, 2014

Francisco Pinheiro

6 Appendices

6.1 Appendix 1 – The Green-Dot System in Portugal

SPV is responsible for contributing to the Green Dot System, that works as an established eco-system across the key players in recycling



Source: Sociedade Ponto Verde institutional website; team analysis

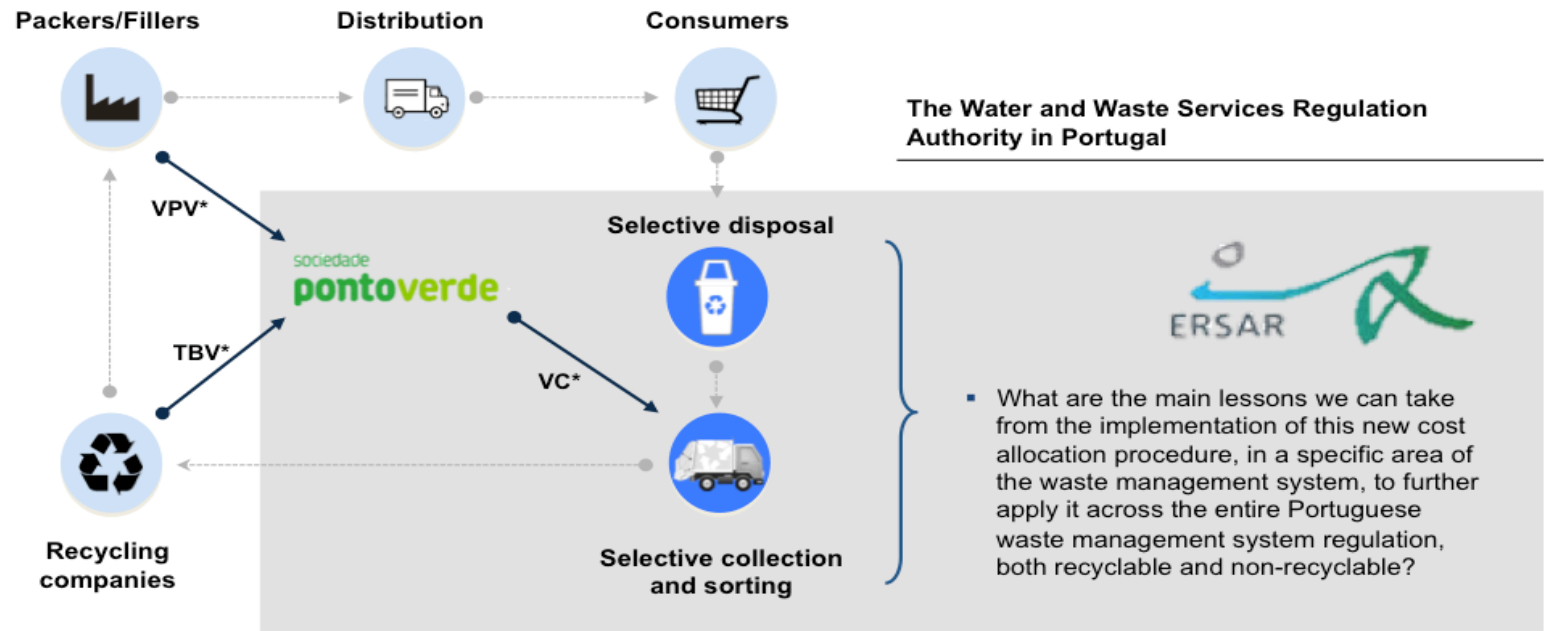
6.2 Appendix 2.1 – Problem Statement Overview (1/2)

The goal of this project is to develop an activity-based cost allocation procedure for the collection and sorting activities of selective waste across the Portuguese recycling ecosystem, managed by Sociedade Ponto Verde and regulated by ERSAR

Detailed in the following slides

The recycling life-cycle* is a developed and complete ecosystem that brings together producers and consumers...

...And is regulated by ERSAR*, to whom the SMAUTs have regulatory compliance

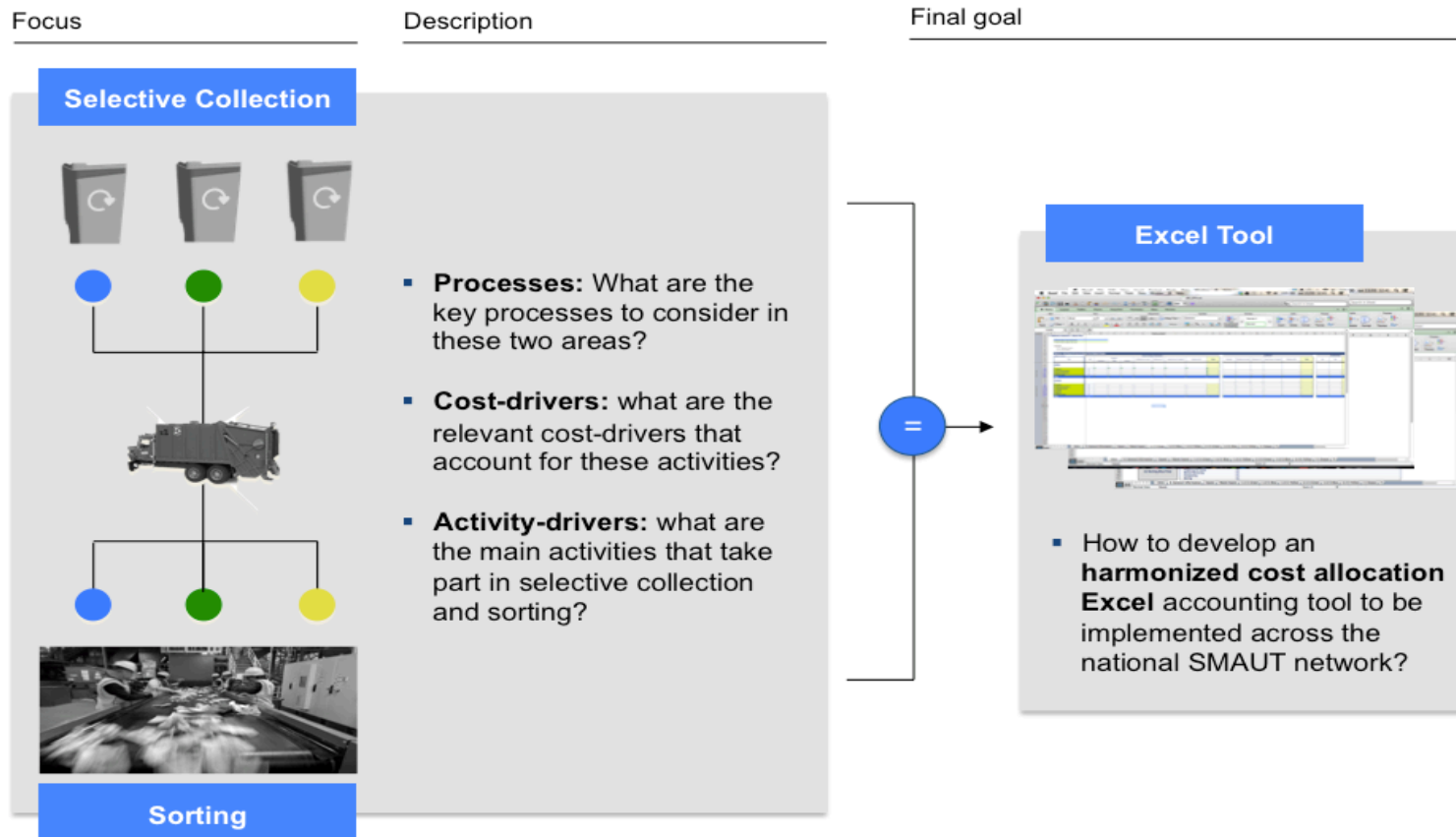


- What are the main lessons we can take from the implementation of this new cost allocation procedure, in a specific area of the waste management system, to further apply it across the entire Portuguese waste management system regulation, both recyclable and non-recyclable?

Notes:
 * - Detailed in the following sections of this report
 Source: Anexo IV – Modelo de Apuramento de Valores de Contrapartida (Fluxo Urbano)

Focus of the project
 Out of the scope of the project
 Consumer goods flows
 Financial flows

Our analysis was directed towards selective collection and sorting, to ultimately develop the harmonized cost matrix tool



Source: team analysis

A sustainable and effective cost allocation implementation program must build on four important areas

Implementation phases as a change management program



Source: Implementing Activity-based costing – Strategic Cost Management, IMA., Team analysis, E&Y Change Management Approach

6.5 Appendix 4 – User Manual

Appendix

User manual with detailed description on how to use the Excel tool*

Manual cover

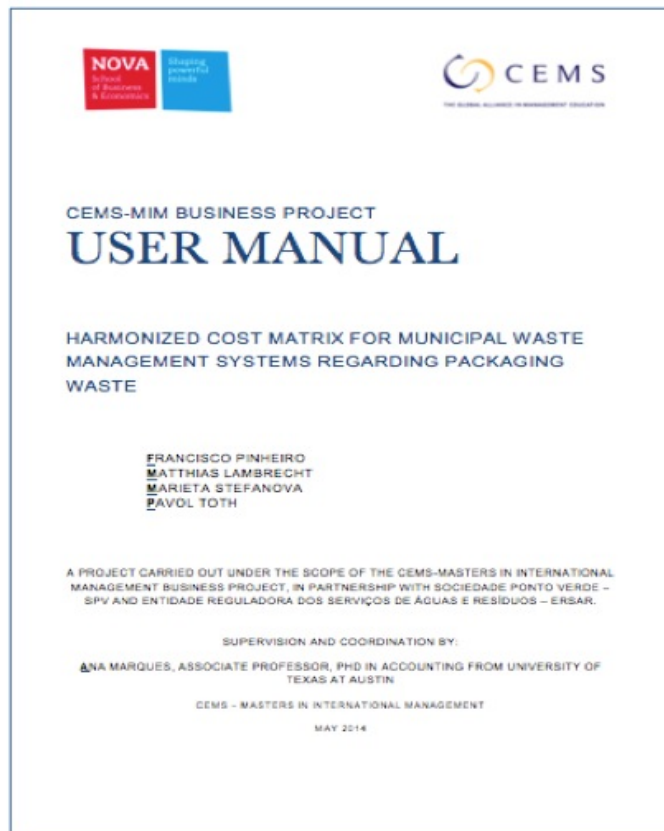


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Notes:

* The manual was delivered as an attachment with this report

Source: Team analysis; information from meetings with partner companies

The model tries to allocate costs across all the relevant processes, activities and materials within each recyclable waste flow

Steps	Description	Result
<p>1</p> <p>Types of cost</p> <p>X</p>	<ul style="list-style-type: none"> Assessing the total cost of each cost driver on an annual basis, as requested by SPV/ERSAR, both CAPEX and OPEX by requiring the users to input all the costs associated with collection and sorting of selective waste. 	<div style="border: 1px dashed black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center;">Total Cost</p> <hr style="width: 50%; margin: auto;"/> <p style="text-align: center;">Recyclable Material</p> </div> <ul style="list-style-type: none"> Per activity, flow, process, among others required by SPV. Opens the door to benchmark SMAUTs on an annual basis.
<p>2</p> <p>% allocation to each flow</p> <p>X</p>	<ul style="list-style-type: none"> Based on each SMAUT's expertise and knowledge of the business, the total cost should be initially broken down into each flow across both collection and sorting activities. 	
<p>3</p> <p>% allocation to each activity</p> <p>X</p>	<ul style="list-style-type: none"> On a third level of assessment, request each SMAUT to input the allocation of each cost driver, on each flow, to each and every activity for both collection and sorting. 	
<p>4</p> <p>% material sorted throughout each activity</p>	<ul style="list-style-type: none"> Finally, a last allocation is required to know how much of each material is sorted in each process, to allow an allocation of cost per material at each stage of the recycling cycle. 	

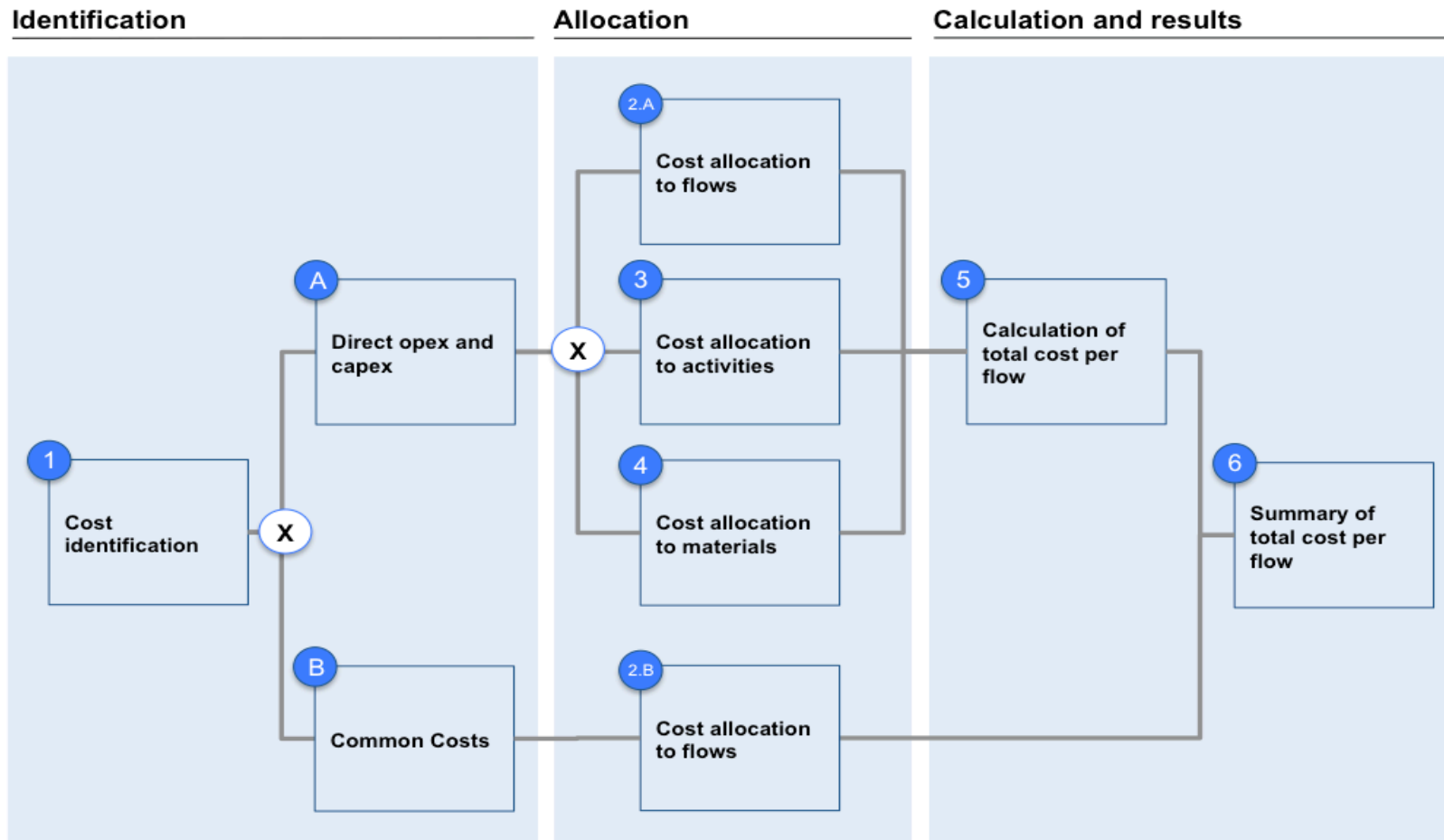
Notes:

- Assuming the yellow flow has six types of materials sorted
- Although the final goal of the project is not to determine the final cost per material sorted, it will be interesting to benchmark each SMAUT's performance on a *per material* basis.

Source: Team analysis; literature analysis

6.7 Appendix 6 – Cost Allocation Steps and Processes

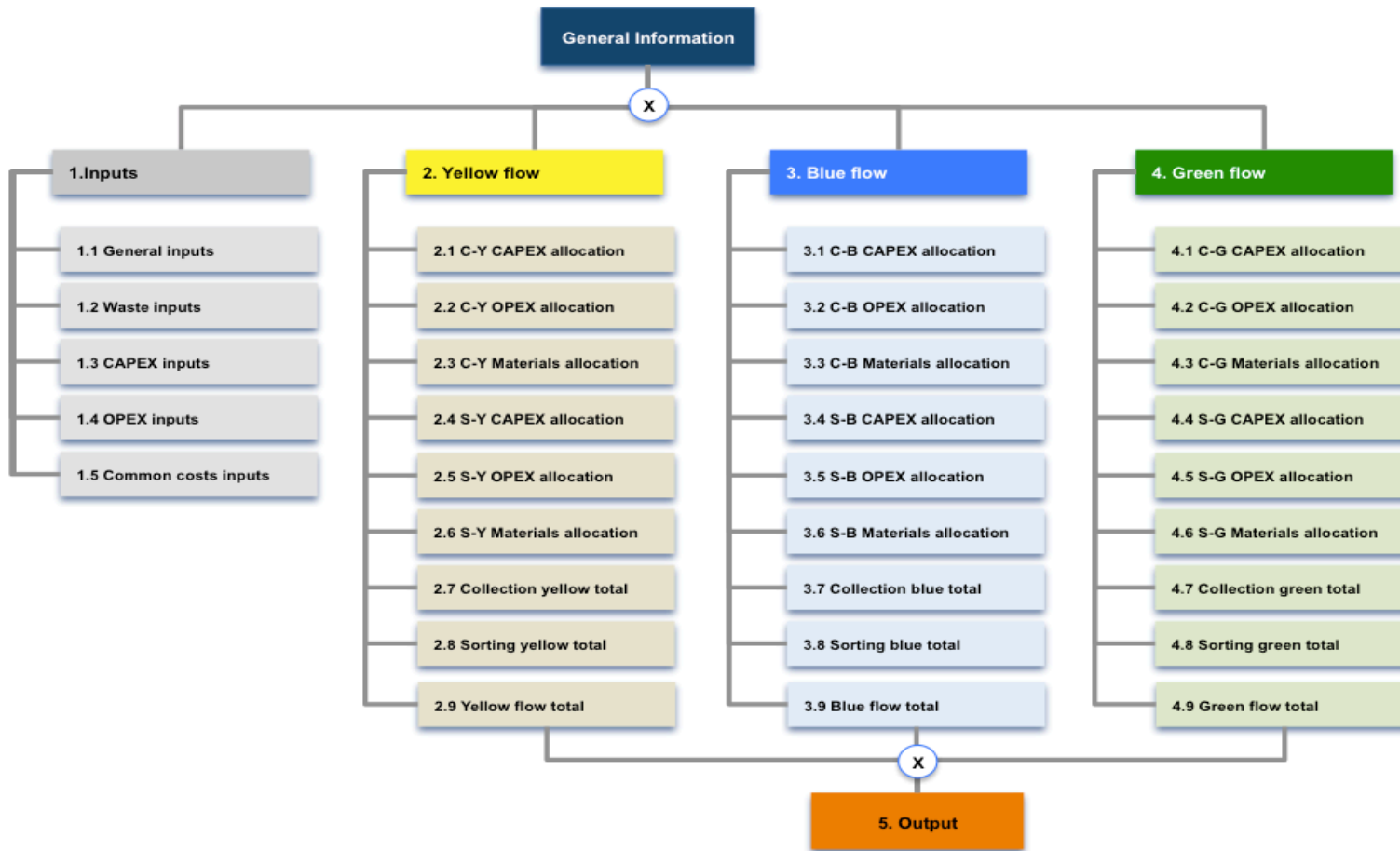
Cost allocation model steps and areas



Source: team analysis

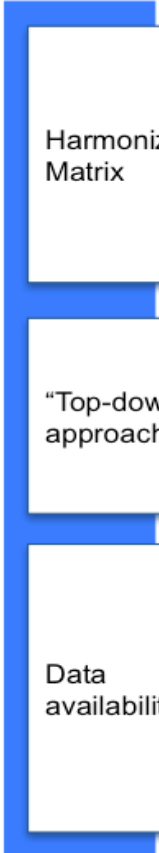
6.8 Appendix 7 – Final Excel Model Sheet Structure and Setup

The final cost allocation matrix is structured as follows






Source: Team analysis


This model does not fulfill all the characteristics of a typical ABC model due to the project’s inherent constraints...

Constraint	Description	Result
 <p data-bbox="338 552 564 815">Harmonized Matrix</p>	<ul data-bbox="600 552 1285 807" style="list-style-type: none"> ▪ ABC is all about measuring profitability to the highest degree of detail possible, which would require the development of a model to fit each SMAUT’s specific sorting station set-up. However, since this project is meant to measure activities on an harmonized way, it is not possible to go into too much detail, as there is a large trade-off between accuracy and flexibility. 	<ul data-bbox="1348 552 1823 683" style="list-style-type: none"> ▪ Processes, activities and flows’ management are not traced to highest level of detail as a typical ABC project would require.
<p data-bbox="338 847 564 1046">“Top-down approach”</p>	<ul data-bbox="600 847 1285 978" style="list-style-type: none"> ▪ Cost allocation is done by taking the yearly costs and breaking them down to smaller pieces. In the end, the idea is to obtain a cost per activity. In ABC, the first step is to calculate the real cost per activity. 	<ul data-bbox="1348 847 1823 978" style="list-style-type: none"> ▪ This is imprecise because in many cases the costs are split by estimation and doesn’t correspond with real value.
<p data-bbox="338 1078 564 1366">Data availability</p>	<ul data-bbox="600 1078 1285 1241" style="list-style-type: none"> ▪ The SMAUTs are not prepared to disclose as much information as an ABC implementation project would require. Therefore, the cost-traceability features of the ABC approach are not fully implemented within the scope of this project. 	<ul data-bbox="1348 1078 1823 1305" style="list-style-type: none"> ▪ Operational information is not disclosed at the necessary level of accuracy and detail as an ABC project would require. Hence, a few important costs are not correctly allocated, such as energy consumption levels.



Source: Team analysis; literature analysis

There is a number of risks that SPV and ERSAR must take into account when implementing this new model (1/2)

Risk area	Description	Level of impact
<p>1</p> <p>Cost allocation on a percentage basis</p>	<ul style="list-style-type: none"> Our model is based under the assumption that most of the SMAUTs may use their expertise and knowledge of their operations to allocate their activities on a percentage-driven basis with a moderate degree of accuracy. However, it opens the door to inaccuracies. 	<p>High</p> 
<p>2</p> <p>Non-audited input figures</p>	<ul style="list-style-type: none"> It is not possible to ensure that the SMAUTs inputs are the correct ones, as the model does not have any audit-approved methodology. How to make sure that the inputs are accurate and in accordance with reality? 	<p>High</p> 
<p>3</p> <p>Learning</p>	<ul style="list-style-type: none"> This is a new cost-accounting perspective, which requires substantial training and practice from end-users, so a big issue is on how to ensure that the managers know how to work with the new model. 	<p>Medium</p> 

 High
 Medium
 Low
 Source: Team analysis; literature analysis

There is a number of risks that SPV and ERSAR must take into account when implementing this new model (2/2)

Risk area	Description	Level of impact
<p>4</p> <p>Incentives</p>	<ul style="list-style-type: none"> Given that the ultimate goal with this project is to assess efficiency and benchmark waste management organizations one against another, what is the incentive for these governmental entities to perform this new cost allocation model? Will they be rewarded for being efficient? 	<p>High</p> 
<p>5</p> <p>Flexibility vs. accuracy trade-off</p>	<ul style="list-style-type: none"> This model is not as accurate as it could be, but it is virtually impossible to do this more accurately and customized with 23 different SMAUTs, as each one encompasses different processes and machinery set-ups, without additional resources, expertise and/or cooperation with local entities. Nevertheless, the results will be consistent across SMAUTs, which will allow for the performance and benchmark goals of this project. 	<p>Medium</p> 

● High
◐ Medium
○ Low
 Source: Team analysis; literature analysis

6.12 Appendix 10 – Recyclable Waste Flows

The recycling system covers three key flows of waste which bring together similar types of packaging waste

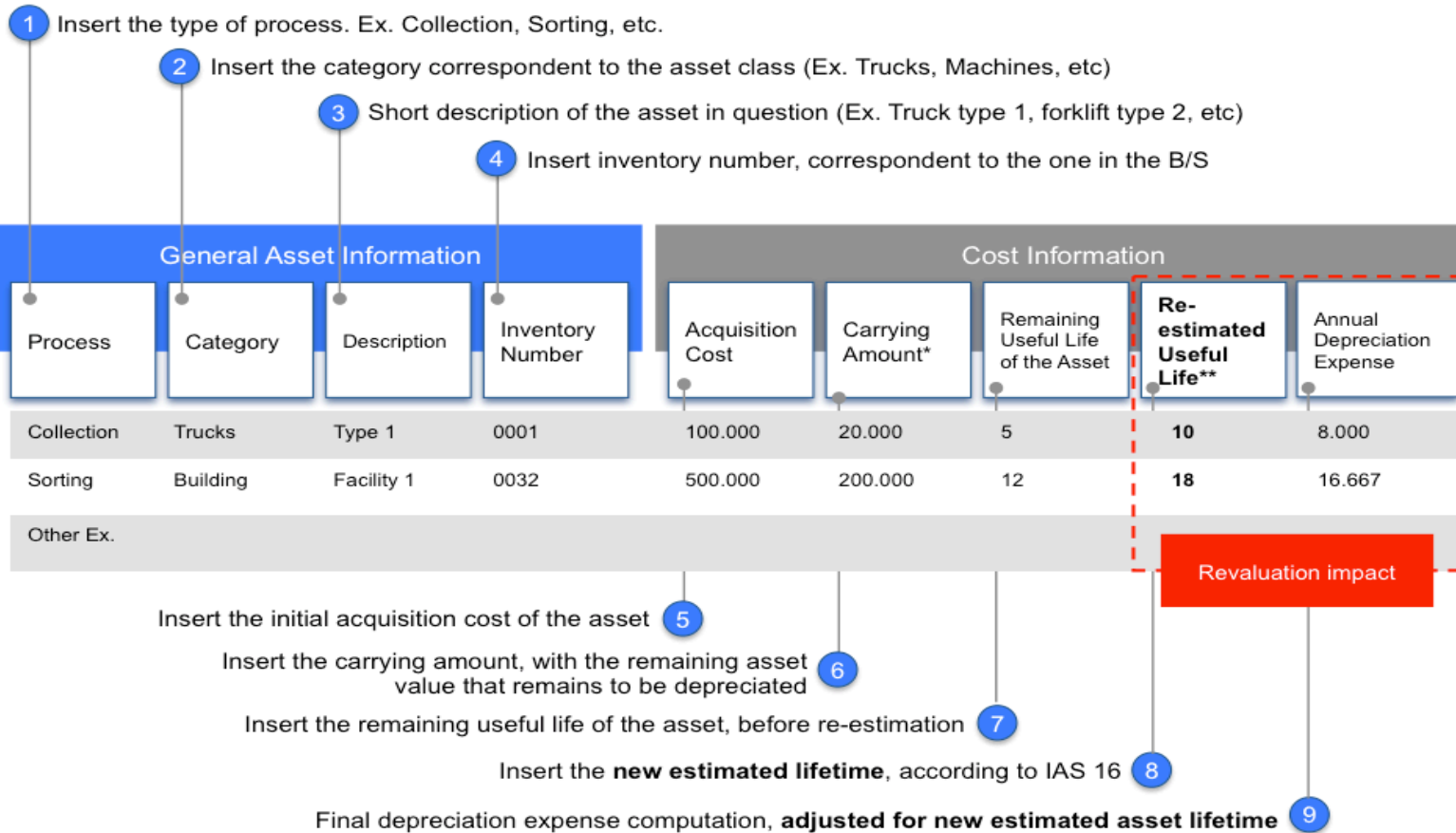
Flows	Description	Examples
 <p>Yellow</p>	<ul style="list-style-type: none"> Encompasses packaging plastics and metals. Materials include steel, aluminum, film, PEAD, PET, ECAL and Mix of Plastics. 	<ul style="list-style-type: none"> Soda cans, milk or juice plastic containers, supermarket bags, butter containers, home-care containers, etc.
 <p>Blue</p>	<ul style="list-style-type: none"> All packaging materials related to paper and cardboard. 	<ul style="list-style-type: none"> Beverage cardboard containers, industrial cardboard, paper journals, cereal boxes, paper bags, etc.
 <p>Green</p>	<ul style="list-style-type: none"> Domestic and industrial packaging glass-made containers. 	<ul style="list-style-type: none"> Glass bottles, jars, flasks, among others.
 <p>Wood</p>	<ul style="list-style-type: none"> Wooden-made materials that are no longer used domestically. 	<ul style="list-style-type: none"> Wooden wine boxes, cheese boxes, etc.

Detailed in this project
 Out of the scope of the project

Source: Anexo IV – Modelo de Apuramento de Valores de Contrapartida (Fluxo Urbano)

6.13 Appendix 11 – Asset Lifetime Depreciation Revaluation Tool Rationale and Example

Depreciation lifetime revaluation tool Example



* Carrying amount net of residual value

** According to the pre-established procedures detailed in IAS 16 – Property, Plant and Equipment

6.14 Appendix 12 – Accounting Vs. Real Depreciation Charge Example

Accounting Vs. real depreciation charge assessment*

Example for an acquisition expense of 100.000€ w/o residual value

	Year 1	Year 2	Year 3	Year 4
1 Accounting Lifetime Ex – 2 Years	(50)	(50)	-	-
2 Real Lifetime Ex – 4 Years	(25)	(25)	(25)	(25)
Differences in Depreciation Charges			25	25
Impacts	<ul style="list-style-type: none"> Asset is being overcharged with depreciation expenses in the first two periods according to the accounting lifetime due to poor economic lifetime estimation. 		<ul style="list-style-type: none"> Asset is being undervalued by the accounting lifetime in periods 3 and 4 The result is a lack of rigor and trustworthiness in accounting and SPV does not take account for this expense 	

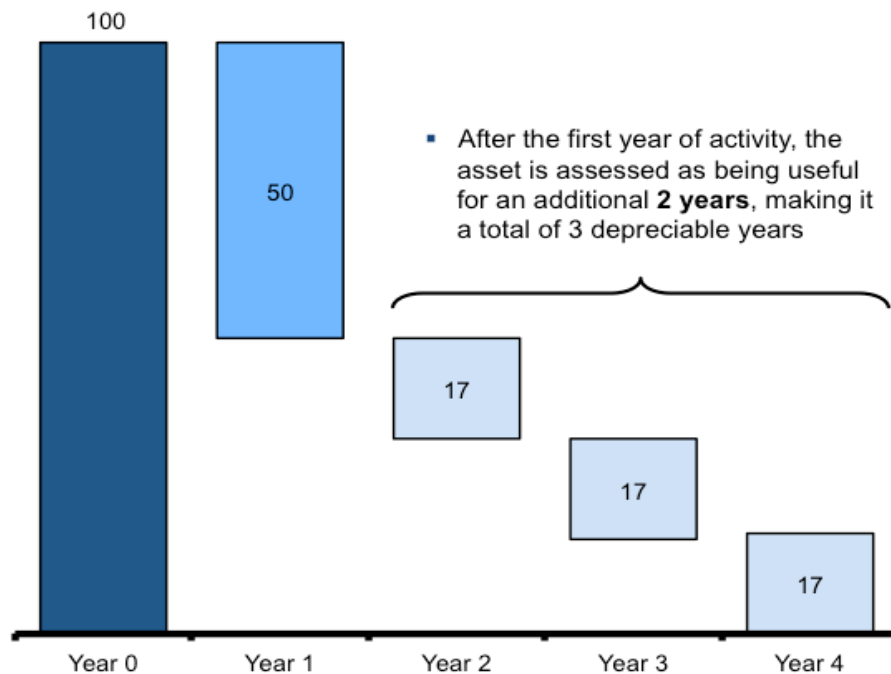
▪ There is still **usage value** in the remaining years that is not being taken into account

* Assuming that both assets are still in use over the four-year period

Asset's depreciable lifetime extension

Example for an acquisition value of 100.000€ w/o residual value and initial expected usage lifetime of 2 years

Depreciation expenses throughout the asset's lifetime
Values in thousands of euros



Impacts for...

- 1 **SPV**
 - Better cost inputs
 - Transparency in accounting
 - Benchmarking
 - *Best practices sharing*
- 2 **SMAUTs**
 - Trustworthy accounting
 - Extended depreciation-linked financial compensation
 - Need to readjust their financial statements (-)
- 3 **Waste management system**
 - Transparency
 - Efficiency (as benchmarking and best practices sharing get implemented)