Analysis PWC Study

In-depth analysis (slide per slide) **1**
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General comment in this document.

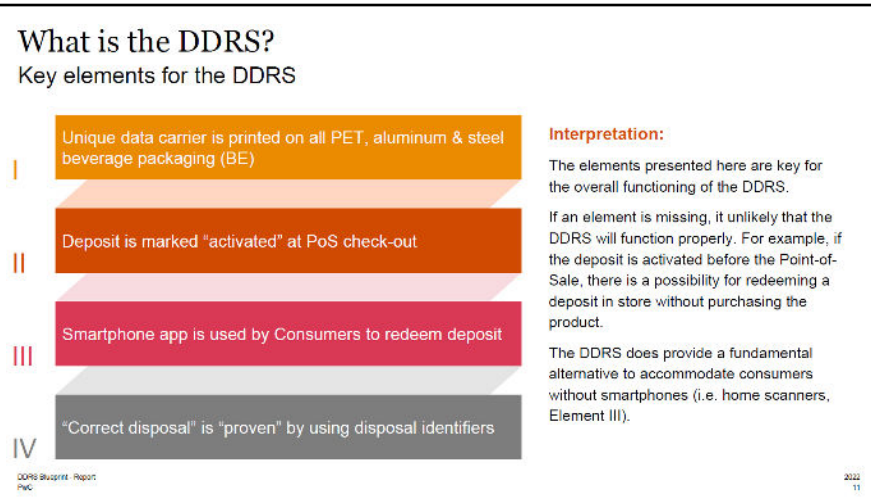
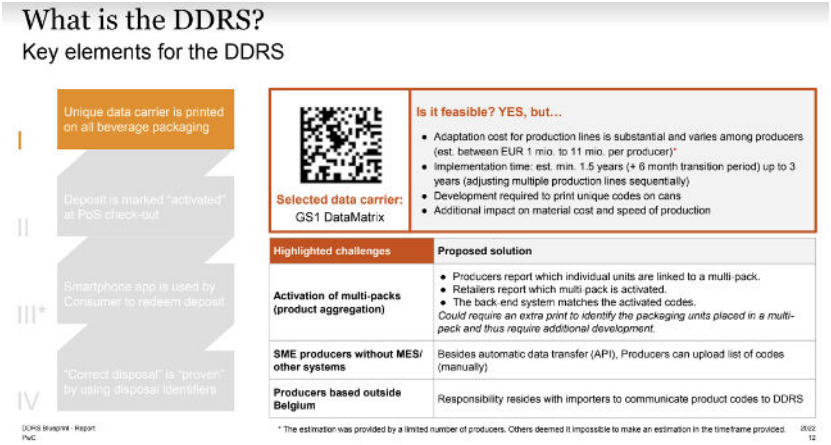
In-depth analysis (slide per slide)

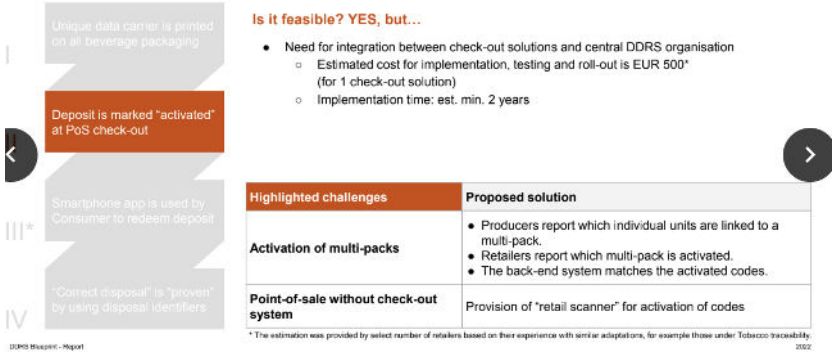
Additional remarks:
In *blue* are additional questions
In "*grey*" I added quotes from the report.

- Quid reuse?
- Quid potential for an European system?

Slide	Screenshot	Remarks
Introduction		

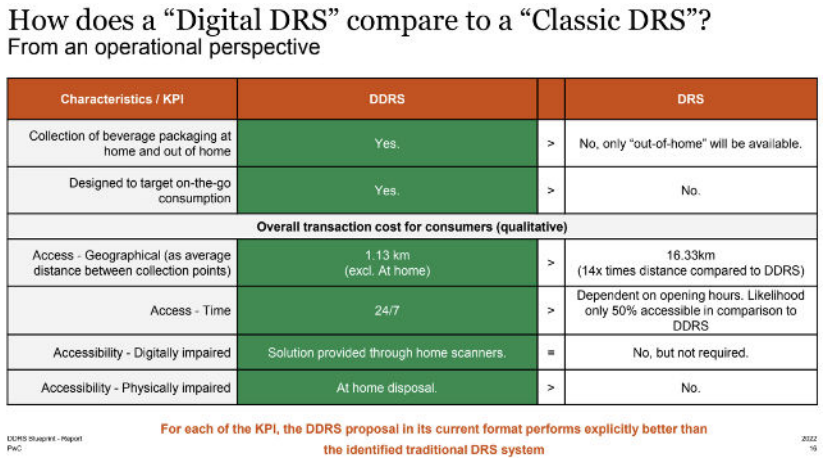
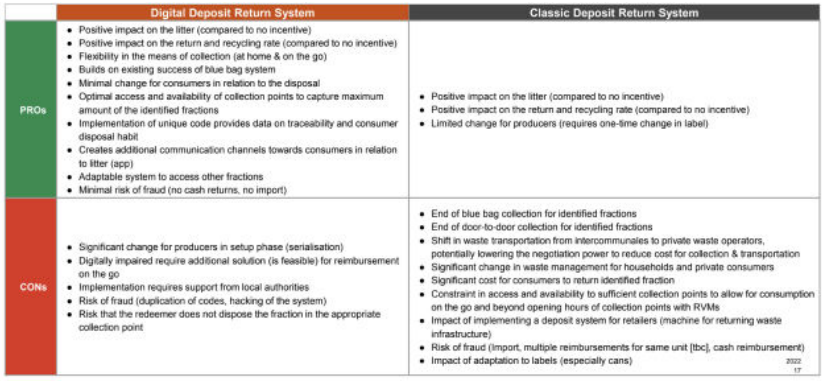
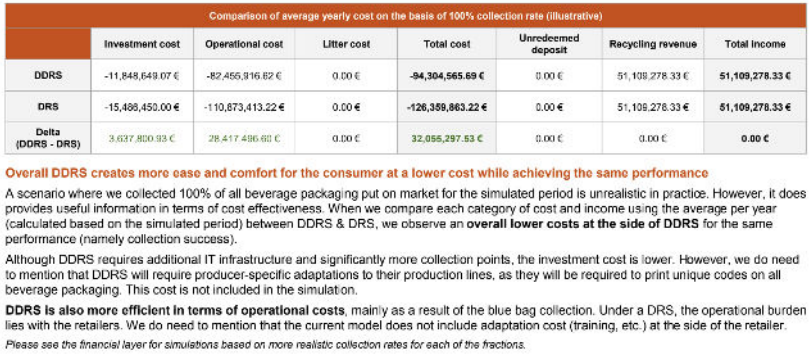
4	0. Project overview **Scope of the DDRS blueprint** Development of a blueprint for a Digital Deposit Return System for beverage packaging put on market in Belgium Fost Plus, Fevia and Comeos partnered with PwC to develop a blueprint for a Digital Deposit Return System for PET bottles and aluminum and steel beverage cans put on the market in Belgium. The proposed blueprint must: • Preserve the current system of selective collection and sorting (e.g. via the blue bag), and thus not cannibalise it • Start from the premise that a value is given to packaging that a consumer wants to get rid of • Serve as a clear argument for why this approach is better than the classic deposit system, supported by figures The current blueprint provides for: • A description of the jointly identified digital tool • Identification of the different blocks of which it is composed • How it will work (operational choices in the field) • How the financial flows will run • How the material flows will run • How the legal and specifically GDPR obstacles will be tackled • Which new parts in the logistic flow are needed • Which steps need to be taken to make all this operational, etc.	The study is set up to preserve the system of the blue bag. So that already quite limits the scope of thinking and shows the main thing that industry wants. It is not about the optimal system, but about preserving the blue bag. The study is set up in such a way that it should serve as a clear argument in favor of the DDRS compared to RTR-DRS, supported by figures. It is of course their right to set up studies like this but it strongly reduces the objectivity of it. But: - Businesses have lobbied for policy based on this study with the suggestion that they have studied the topic; - Businesses are making a lot of claims about the QR-system. But if their research is to prove a point at all cost instead of actually learning, then the statements will likely lack enough substantiation
10	**What is the DDRS?** Operations from a consumer perspective **Consumer** redeems deposit when correctly disposing their beverage packaging • Consumer scans bin identifiers • Consumer scans product • Consumer disposes of product and retrieves deposit through bank account Home scanner for households without smartphones Mobile application Consumer scanning devices Disposal at home Blue bag Disposal on-the-go* Public blue bin Smart bin DDRS disposal options	• *Home scanner*: a home scanner seems to require an internet connection and a link with a bank account, which are big problems linked to the digital divide. *How much would they cost and who would have to pay for them?* (certainly cannot be household themselves, would penalize the ones who do not have a smartphone / do not know how to use them). *What if a home scanner breaks? Do consumers need to justify what happened to them?* • *Mobile application*: *what will be done to support consumers in case of issues with the App (problem connection, scan doesn't work, app bug …)? And how fast will problems be solved?* • *Disposal on-the-go*: With disposal in generally open public bins, the quality of the recyclate is likely to be low (public "blue" bins which do not seem to prevent the discarding of non-PMD waste). *Will this count as 'separate' collection?* • Public bins on-the-go vs blue bag: citizens need to pay for a blue bag (15 cents for 30 liter). *How to make sure citizens will not use the public bins instead of the blue bags for plastic bottles and cans consumed at home?* • *"through bank account"*. *What about consumers who do not have a bank account / do not want to link it?*

11		- *With respect to the activation of the deposit: will this be equally easy to activate for small shops compared to big shops?* - *What are the 'disposal identifiers' to prove 'correct disposal' and how is privacy ensured?* - *What about resale of products, for example to festivals and small shops? So when point of sale is different than expected?*
12		• Substantial adaptation cost (**est. between 1 to 11 million per producer**). • Also interesting to note that the researchers asked for an amount within a specific timeframe (see * at the bottom of the slide) and several producers were not able to provide an estimate. Ask why that was. Both the huge range in adaptation costs & the lack of being able to provide a cost estimate within a specific timeframe, seem to indicate a lack of understanding of actual possibilities and costs to change production. • The study doesn't really make the timeline very clear. It talks about 1.5-3 years implementation time + 6 months transition cost, but also it talks about 'development required to print unique codes on cans', additionally there is an additional impact on material and cost and speed of production. What does this overall mean for the timeline and the costs? *What about small producers?* The slide already talks about a different 'upload' system for small producers. • Implementation time: 1.5 to 3 years (+ 6 months transition) = not achievable by 2025. • Coke & Heineken fill at 120k cans per hour. There is no technique that matches this speed. On average it is 90k per hour. When going slower, costs increase a lot.

		Voor onze lijnen zijn de printtechnieken te laag. allemaal. 16:24 En tragere lijnen gaat de kost voor de can heel hard omhoog. Dat gaat niet gebeuren. 16:25 Dat hebben ze op die pagina nog samengevat als een extra nadeel, zonder financiële kost erbij 16:25 Coke en heineken vullen af op 120.000 per uur. Dat is ook te snel voor alle technieken. 16:26 Gemiddeld is 90.000 per uur afvullen. 16:26
13	**What is the DDRS?** Key elements for the DDRS 	• Needs **min** 2 years • Check-out solution = what corresponds to “1 check-out”. *Is it one point of sale, how does this materialize*?

14	
	Mobile app:
	• Used to reclaim deposit by reading GS1 DataMatrix to extract product code
	• Initialization by providing basic user information (name, address, bank account information)
	• Authentication should use 'Itsme', but alternatives are foreseen (e.g. manual)
	Alternative for "digitally impaired": Home scanner
	• **One scanner is registered per household** (e.g. address, primary user)
	  ○ Initial registration & distribution through municipalities
	  ○ Citizen completes account information through DDRS website (Itsme, ID-reader, manually)
	  ○ After information is completed, scanner can be used
	• **This solution is also applicable to:**
	  ○ Grouped/ collective living & working environments (schools, prison, offices, elderly homes, hospitals, etc.)
	  ○ Points-of-sales without check-out solution
	• The cost per scanner (home & retail) is estimated at 27.50 €
	
	2022
	14
		• Identification par "Itsme" is quite advanced for users and most likely will lead to fail (see here for frequent bugs).
		• With respect to convenience: *how easy is it to register?*
		• *What about tourists? Do they all need to install an app? Can we also ask that much from consumers in general?*
		• System for 'digitally' impaired relies heavily on municipalities who might not want that and still expect citizens to register on a website, this is irrealistic.
		• *Who pays the cost per scanner? What if it is broken? It seems that a scanner should then be something like a public service because consumers have the right to get their money back. How to guarantee the service?*
		• *What about that scanner for points-of-sales without a check-out solution? What is meant here? That they can activate the code in that way?*
		• *What about the digitally impaired when on-the-go*?

15	**Disposal identifier (blue bag, public blue bins) - Options**
	1. **DataMatrix** (other machine readable data carrier)
	  a. Serial number to distinguish disposal options
	  b. Physical form: sticker
	  c. Est. cost: EUR 0.01 - 0.15
	
	1. **Near field communication tags** (NFC)*
	  a. Minimally NFC Type 2
	  b. Outdoor vs Indoor version to distinguish disposal options
	  c. Est. cost: EUR 0.25 - 2.50
	
	***Please note:** A second scan (of the bin/bag) proves the packaging is returned correctly. We include information on NFC tags as it could avoid the need for a secondary scan. Moreover, NFC tags are more difficult to replicate compared to a sticker. Despite these advantages, it is a developing technology and not all smartphones are equipped to interact with NFC tags (yet).
		• So it looks like this slide is specifically about the identifiers on disposal units. Cost range is quite big but that is understandable considering the range of ways to put them on.
		• About the bins: *how sensitive are QR-codes to being misread, especially considering weather and tear in public spaces?*
		• General remark about QR-codes: *how big do they need to be? What possibilities with respect to placement (on packaging) does that lead to?*
		• Second scan still doesn't "prove" the correct disposal (e.g. putting the packaging outside of the bin after the double-scanning)
		Worse, one could even imagine a user making a copy of the QR-code on the blue bag or public bin and thus retrieving the money anywhere (unless there is geolocation, which raises further privacy issues. Moreover, even geolocation is not accurate enough to tell whether the packaging is thrown in the public bin or right next to it (e.g. if it is full).
		• *What is the cost of the NFC? How can it be mentioned if not accounted between the costs? How long would it take to be operational*?

16		What is the scenario used for DRS? ● This entire table is largely suggestive. Accessibility is framed in ways to suit the digital solution. ● Row 1 (Collection at home and out of home) and 2 (designed to target on-the-go consumption) are contradicting each other: how can it be 'only out-of-home' but not designed to target on-the-go consumption. With collection in stores, there is not really a matter of *'being able to target on the go consumption'* that really only is a thing when the alternative is to put it only in the blue bag. > Traditional DRS is in essence designed to a) reduce the presence of in-scope packaging in litter AND b) increase return rates. Simply see the impact it has on litter in many countries (factsheet RNB) ● Accessibility digitally impaired > home scanners are not a good enough solution ● Accessibility - physically impaired > it is false to assess that DRS cannot offer at home collection (see how many delivery systems such as Picknick, AH now offer to collect packaging with a deposit upon grocery deliveries).
17		See suggestion updated cost comparison at the end of the document - This table too is beyond suggestive and not at all trying to list pro's and cons in a fair way.
18		There is absolutely no justification or detail for the costs presented. - *Investment cost*: *what are the costs of developing the technology of a digital system, investment in backend system, amortization of the many (outdoor) collection points…* - *Operational costs*: Again, doesn't include adaptation costs. - *Littering costs & unredeemed deposit revenues*: ofc those are the same given a given collection rate assumed. However, in reality the ability to achieve a certain return rate is linked to convenience and accessibility for consumers, which this study makes doubtful. - *Recycling revenue*: *what about the difference in quality of the recyclate when keeping the packaging in the same stream (risk of contamination)?* - Note: *Producer-specific adaptations* costs are not included which flaws the results completely. *What are those costs?*

		- *Adaptation cost* (training) not included: which would potentially be way higher in DDRS (training for systematic check-out vs simple punctual assistance) *What are those costs?*
19	How does a 'D-DRS' compare to a 'Classical DRS?' DDRS PET / Aluminium / Steel Impact on operational cost: -880.72 € / -1,000.46 € / -605.37 € Impact on recycling revenue: +536.25 € / +992.02 € / +224.45 € Direct impact on operational cost per ton collected: -344.47 € / -8.45 € / -380.93 € Impact on operational cost of collecting + 1 ton for each fraction: -733.84 € Impact on litter cost: +3,210.11 € / +3,384.10 € / +3,388.35 € Impact on unredeemed deposits: -12,660.31 € / -16,013.45 € / -7,649.61 € Total impact on financial results per ton collected: -9,794.67 € / -12,637.80 € / -4,642.18 € Total impact on financial result + 1 ton for each fraction: -27,074.65 € DRS PET / Aluminium / Steel -1,136.79 € / -1,437.87 € / -686.87 € +536.25 € / +992.02 € / +35,686.78 € -600.54 € / -445.86 € / -462.43 € -1,508.82 € +3,210.11 € / +3,384.10 € / +3,388.35 € -12,660.31 € / -16,013.45 € / -7,649.61 € -10,050.74 € / -13,075.21 € / -4,723.68 € -27,849.63 € **DDRS is more cost effective compared to DRS in the short and long term running of the system** As there is currently no accurate basis to identify the collection rates of a DDRS or DRS, we have added a sensitivity analysis to show how the total cost evolves with higher collection rates (*see Financial Layer*). From this overview, we can conclude that the operational cost related to collecting one more ton for each fraction is two times higher for the DRS compared to DDRS, while revenues from recycling & unredeemed deposits increase and litter costs decrease at an equal rate between DDRS & DRS. This means that improving the performance of DRS will be more costly compared to DDRS.	• Recycling revenue: *how to explain that the increase of recycling revenue is higher in DRS only for steel?* (quality of the recyclate would be higher also with PET and aluminium given lower contamination compared to the Blue bag or public bins). • Same as previous slide: the impact on litter and unredeemed deposit is largely based on system performance. Assuming specific return rate therefore makes little sense. • *See questions slide before*. • We would like to have all information that should support these calculations
I) Technical layer (24-40)		
25	A DDRS Collection option - overview Proposed combination of collection options in end state Disposal at home: Blue bag Disposal on-the-go: Smart bin / Public blue bin Technology requirements (Hardware): Bin identifier (Datamatix, sticker) [Alt: *NFC tag****] / Bin identifier (Datamatix, sticker) Access control (NFC)** Connection to internet Certificate based authentication / Bin identifier (Datamatix, sticker) Technology requirements (reimbursement): DDRS application/ Home scanner / DDRS application / DDRS application Operations location strategy: Distribution through blue bag sales / *(See later)* / *(See later)* Operations bin management: As-is / Through IC/ municipalities / Through IC/ municipalities Finance - Investment (EUR): 0.01 - 0.15 per sticker [Alt. per NFC: *0.25 - 2.50****] / 1,200 - 4,500** per smart bin / 265 - 1,200 per bin *Based on component cost (overestimation), not readily available *** Option not included in simulations **Not readily available in the market (potential underestimation); Option not included in simulation DDRS Blueprint - Report PwC 	• *Price of 'Smarts bins' is clearly underestimated*. The Resources Future impact study for Wales spoke of an average of £4500 per bin (not including development, depreciation and annual maintenance costs). > P 47 of the study "***Costs for this smart E-bin are £4,500 per unit, with operational costs of about £675 per year (15% of capex). Installation costs have been estimated at £1,350, and have a lifetime of between 5 and 10 years.***" • *The NFC option is not included* in the costs and simulation! Even though it would be very expensive, which distorts the results by underestimating them. • *Home scanner option is only available for disposal at home*, which means that consumers without a smartphone are excluded from all redemption outside of home.

26	A DDRS Collection option - Blue bag	• Limited behavior change: is it what we want (e.g. staying in a society of single-use)?
		• Disadvantage forgotten: heavy reliance on technology still (quid home-scanners and digital impairment)
		• Risk of fraud
		• Advantages are very subjective:
		  ○ First point is no comparison to return to retail, just says that they have two options
		  ○ Proven performance of blue bag says nothing as it is exactly the lack of performance on litter which makes DRS necessary

	Comments • Blue bag is the cornerstone for collection under DDRS • Creates the option to redeem the deposit from the comfort of your home, using a smartphone or home scanner • A bin identifier (sticker) is provided through blue bag sales to enable use for DDRS *Example* DDRS Blueprint - Report PwC 2022 26 **Blue bag** **Targets**: Disposal at home & in semi-closed environments **Advantages**: • Convenience for all "consumers/ buyers" (irrespective of smartphone possession) • Proven performance of the blue bag system • Can be expanded to other recyclable fractions • Limited behavioural change • No adjustment of logistics (waste streams) • 100% accessible for all categories (24/7) **Disadvantages**: • Extra effort of scanning	○ '*can be expanded to other recyclable*' fractions says again nothing about the desirability of the system ○ *'limited behavioural change'* is not true in comparison to return to retail, which is something people already know and do, while scanning packaging isn't ○ *'100% accessible'* is contestable
27 - 28	A DDRS collection options - Public blue bin **Comments** • DDRS blue bins are deployed in the public domain in collaboration with local authorities • A bin identifier (sticker) is placed on each DDRS blue bin to enable use for DDRS • Creates access and comfort for the consumer to redeem their deposit on-the-go using the smartphone application • During the implementation of DDRS blue bins, public bins will be equipped with a bin identifier DDRS Blueprint - Report PwC 2022 27 **DDRS blue bin** **Targets**: Consumption out-of-home **Advantages**: • Convenience for the digitally-enabled "consumer/ buyer" • Can be expanded to other recyclable fractions • 100% accessible for all digitally-enabled categories (24/7) • Low threshold for disposal (# of bins) • Visibility of the system in the public space (channel for marketing cfr. Click) • Enabling the creation of homogeneous flows in the public space • Perfectly fits with the growing on-the-go consumption market • Opening of the bins can be adjusted to the DDRS fractions • Low CAPEX **Disadvantages**: • Requires cooperation from local authorities (placement of additional bins) • Potential contamination of waste streams A. DDRS collection options - Public blue bin: market research |	Traflux - Pillar	Traflux - Mini Moloc	Bammens - Capitole series	Bammens - Citypole
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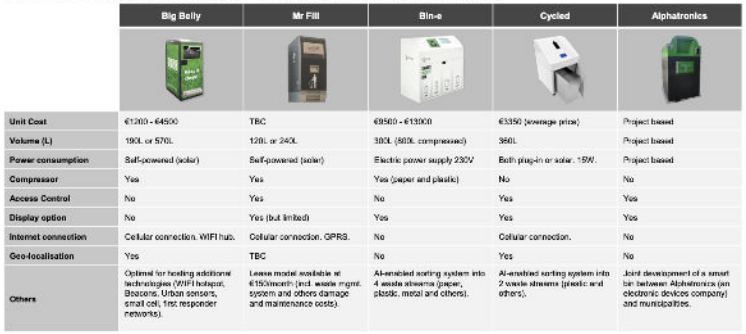
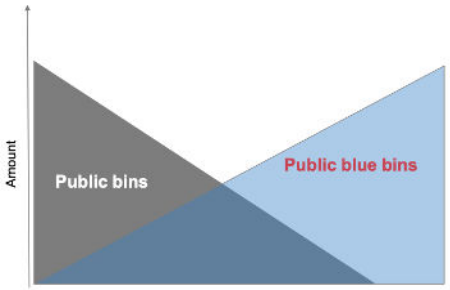
Investment cost	€1100 - €1200	€600 - €900	€265 - €447	€793
Placement cost	€150 - €250	€150 - €250	/	/
Maintenance cost (per bin/ year)	€50 - €70	€50 - €70	/	/
Estimated lifespan	30 - 40 years	20 - 30 years	20 years	20 years
Volume (L)	50 - 200L	200 - 300L	55 - 70L	100L | *Comment: Opening of the bins can be adjusted to the DDRS fractions. In the cost simulation, we have included a cost per public blue bin of 750.00€* DDRS Blueprint - Report PwC 2022 28	Many disadvantages omitted (and advantages listed are hyper subjective) ● Risk of attracting other waste ● Risks of vandalism ● Risk of fraud The risk of contamination makes it largely irrelevant and would require large investment in post-consumer sorting. Besides this type of bins is, until further proven, not suitable to qualify for selective collection. *What if local authorities don't cooperate? Who is responsible for things going wrong or for extra litter because of these public bins*?
29 -3	Smart bins	● *When is it ready to be implemented*? ● "*Access control could be enabled*", *specification*?

0	**I. Technical layer** **A. DDRS collection options - Smart bin** Smart bi **Comments** • Smart bins are deployed in the public domain in collaboration with local authorities, supplementary to public blue bins to tackle 'hotspots' (areas with more concentrated volumes to collect) • A bin identifier (sticker) is placed on each smart bin to enable use for DDRS • Access control could be enabled, but will need to be investigated with suppliers • Creates access and comfort for the consumer to redeem their deposit on-the-go using the smartphone application • Smart bins are included because of their comparatively high capacity occupying the same space in the public domain. This reduces the operational cost for emptying or limits the need to place multiple bins in the same area. **Smart bins** **Targets**: Consumption out-of-home **Advantages**: • Convenience for the digitally-enabled "consumer/ buyer" • Can be expanded to other recyclable fractions • 100% accessible for all digitally-enabled categories (24/7) • Low threshold for disposal (# of bins) • Visibility of the system in the public space (channel for marketing cfr. Click) • Enabling the creation of homogeneous flows in the public space • Perfectly fits with the growing on-the-go consumption market • Opening of the bins can be adjusted to the DDRS fractions **Disadvantages**: • Requires cooperation from local authorities (placement of additional bins) • Potential contamination of waste streams • More expensive compared to public blue bin **I. Technical layer** **A. DDRS collection options - Smart bin: Market research**  Big Belly / Mr Fill / Bin-e / Cycled / Alphatronics Unit Cost: €1200 - 64500 / TBC / €9500 - €13000 / €3350 (average price) / Project based Volume (L): 190L or 570L / 120L or 240L / 300L (600L compressed) / 360L / Project based Power consumption: Self-powered (solar) / Self-powered (solar) / Electric power supply 230V / Both plug-in or solar - 15W. / Project based Compressor: Yes / Yes / Yes (paper and plastic) / No / No Access Control: No / Yes / No / Yes / Yes Display option: No / Yes (but limited) / Yes / Yes / Yes Internet connection: Cellular connection. WIFI hub. / Cellular connection. GPRS. / No / Cellular connection. / No Geo-localisation: Yes / TBC / No / Yes / No Others: Optimal for hosting additional technologies (WIFI hotspot, Beacons, Urban sensors, small cell, first responder networks). / Lease model available at €150/month (incl. waste mgmt. system and others damage and maintenance costs). / AI-enabled sorting system into 4 waste streams (paper, plastic, metal and others). / AI-enabled sorting system into 2 waste streams (plastic and others). / Joint development of a smart bin between Alphatronics (an electronic devices company) and municipalities.	• *Why are the yearly maintenance cost and lifespan not estimated*? This is key for such innovation • Risk of contamination remains very high with all those models • Risk of attracting other types of waste • Risk of contamination, destruction of the smart is very high • Reliance on municipalities is a big risk factor
31 -3 3	Implementation strategy **I. Technical layer** **A. DDRS collection options - Implementation strategy (1/3)** **Optimization to determine the number of collection points** The model uses an optimization technique to find the optimal points between investment cost, operational cost in function of the expected volumes to be collected. To illustrate, the model choses a smart bin, because it is more efficient over time to invest in an extra bin, compared to placing a public blue bin with a higher collection frequency. In the first version of the DDRS blueprint report, we conducted the optimization with a constraint to ensure the same access for consumers (only geographic) using a minimum number of collection points based on kilometres of street per environment type. Based on the feedback, we have reworked the model to reflect scenario in which the collection points out-of-home are aligned with the estimated number of public bins currently available in municipalities. **Digital Deposit Return System (Sc.2)** Public blue bin (simple): Reference model: Traflux - Pillar; Investment cost: 750.00 €; Capacity (liters): 100 L; Number allocated: 136,267 Smart bin - Small: Big Belly; 1,200.00 €; 190 L; 120 Smart bin - Big: Big Belly; 3,000.00 €; 570 L; 8 Smart bin - Big compr.: Big Belly; 4,500.00 €; 570 L; 10	The study mainly counts on Public blue bin (simple), without means of ensuring that consumers can only deposit the deposit packaging in the bin, this strategy is simply a adapted version of The Click, which the lack of success is already clearly seen. > Simply placing new bins of different color won't be a solution (even with +135 000 of them). The bins will remain highly polluted. See for instance multi-bins system in train stations which are still highly contaminated. The implementation strategy is irrealistic for many points: • **The costs (investment + placement) of 750€ for the Public blue bin (model Traflux Pillar) doesn't correspond to the market research of this model (which was estimated at 1250 to 1450€ investment + placement). Seems that the reference cost used is the one of the Mini Moloc model).** • Extreme reliance on municipalities • Very complex system for consumers who - especially on the go - will not follow the rules of disposal, linking to a very large risk of contamination • Period of deployment is extremely long and does not include • The final scenario still seems to be based on mostly (slides 31) still need to be mainly



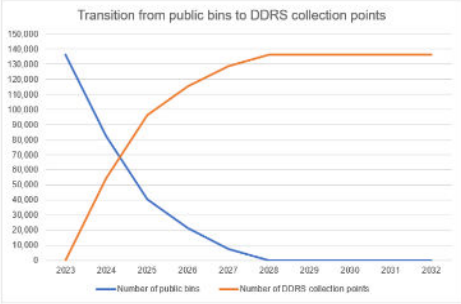
Public bins: possible solution for public blue bin transition

- A substantial amount of new public blue bins are foreseen in the model.
- To allow for a quick deployment of the DDRS, we propose to leverage existing infrastructure of public bins.
  - Stickers are placed on public bins to allow use for DDRS
  - +/- 135.000 public bins in BE
- Public bins are not physically removed from the public space. They still serve for collection of other waste streams. The transition only reflects the use of public bins to redeem deposits in the context of DDRS.

Assumptions

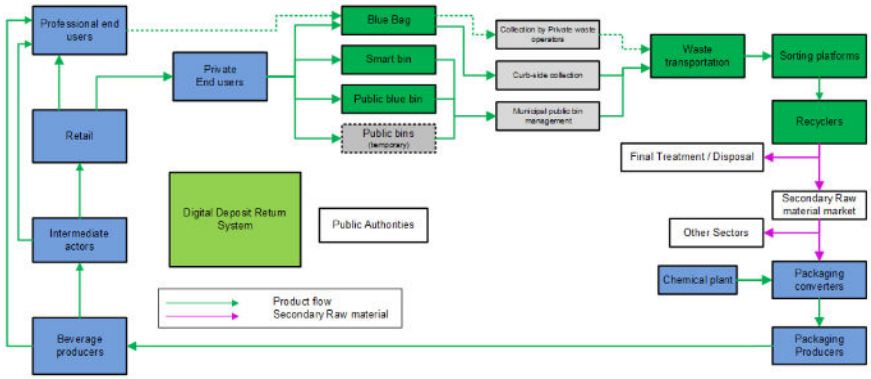
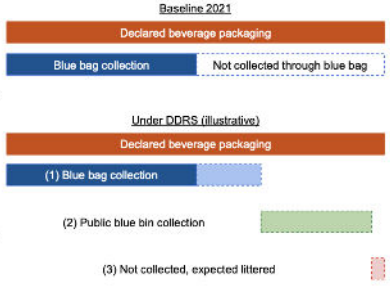
We aim to **complete the transition** from public bins to DDRS collection points **in 5 years** (20XX to 20XX+5). Within a municipality, there will be **no mixed use of public bins and waste bins deployed for DDRS**. This means that before the transition consumers will be able to use the normal public bin to dispose of their beverage packaging (and redeeming their deposit). After the transition, consumers will only be able to redeem their deposit by disposal their beverage packaging in the public blue bins. As mentioned before, the public bin does remain available for other waste streams.

There is a **non-linear switch between municipalities**, as there is a **dominant focus of transition in the first years** (i.e., 40% → 30% → 15% → 10% → 5%). The percentages reflect the portion of beverage packaging we estimated to be collected on the go.

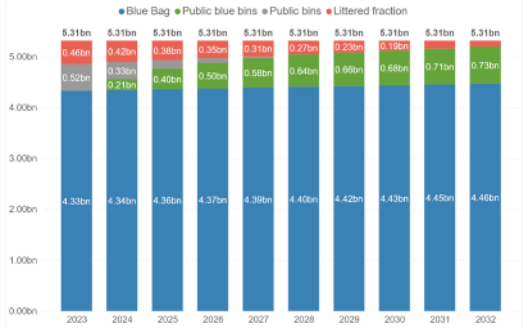
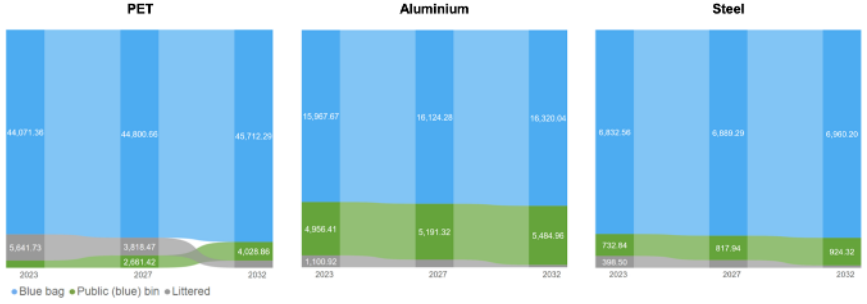


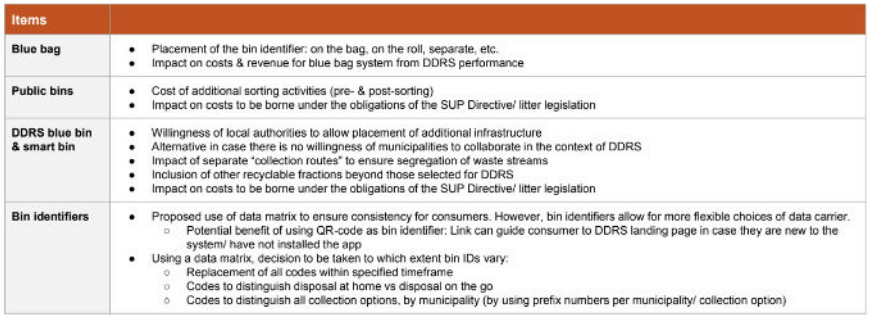
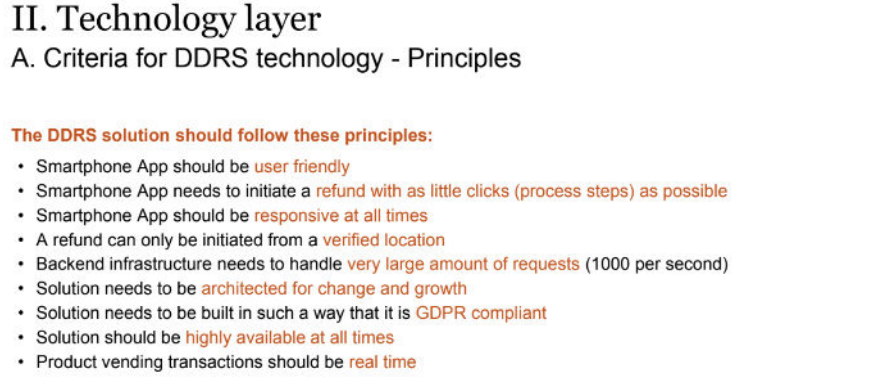
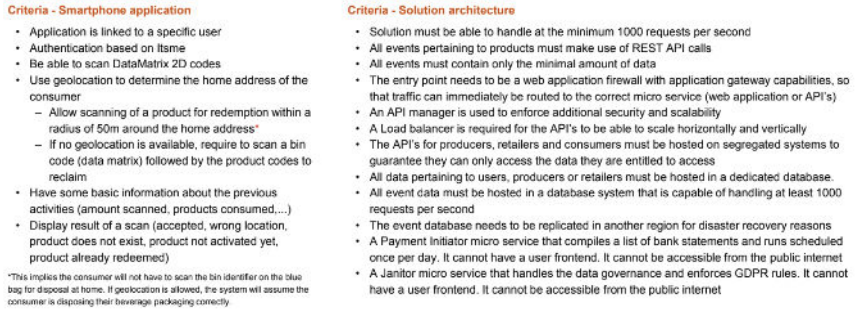
based on non-smart simple public bins, which is by no mean a solution which is most likely gonna link to fraud, discarding of wrong packaging (and thus contamination), full bins leading to the area attracting more litter… An alternative scenario with more smart bins also seems like a very highly costly scenario.

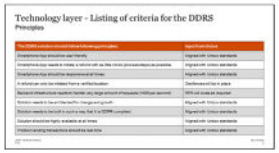
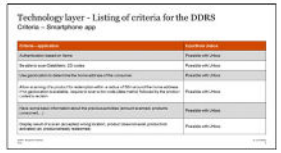
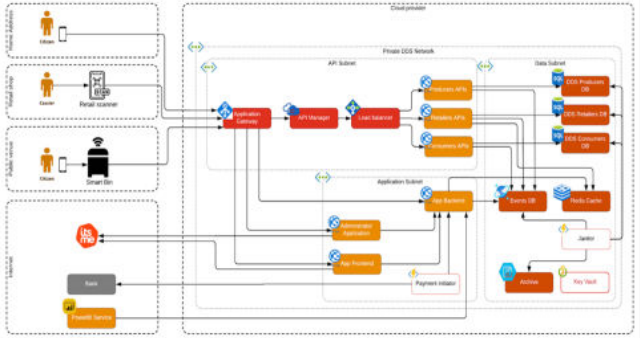
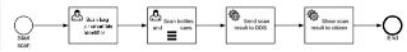
- The model makes no changes in level of contamination, while a smart bin (if it only opens after scanning) obviously has a higher level of cleanliness

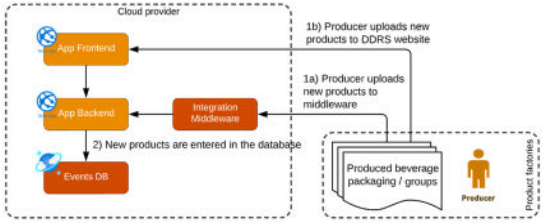
34 - 35	 **Comments** • Partnerships will be needed for implementation of all collection options • Reimbursement ("handling fee") for waste operations will be foreseen for local authorities, in line with Fost plus system • Public blue bins are strongly linked to obligations in the context of SUP Directive (EPR litter) and should be investigated further 	This study reveals that there are still many elements of the design to be determined. The potential need for new waste operations (public blue bin, smart bin) is very ironic: this doesn't seem to be a problem in those scenarios, while similar waste operations for a RTR model are heavily criticized. ● *Is the packaging collected in the 'public blue bins' considered separately collected based on the selective collection criteria of the EU*? Potential contamination of hazardous material (article 2 of the implementing decision)
36 -37	Expected collection rates DDRS deploys several collection options to allow consumers to redeem their deposit. For consumption at home DDRS utilizes the current blue bag system. (1) In terms of collection rates for the blue bag, DDRS is expected to: - Minimally retain current volumes disposed correctly by consumers (current collection rates) - Incentivize the (more conscientious) use of the blue bag (40% of what is currently not collected) (2) To capture those volumes which are currently not collected through the blue bag, DDRS deploys various types of public blue bins (see implementation strategy). (3) What is not collected through the blue bag or through public blue bins is expected to be littered. In practice, the volume littered will be lower as it does not account for the volumes that are disposed, for example, outside of Belgium (holiday), at home in the general waste bin, etc. After implementation of DDRS, it is also possible consumers dispose of their beverage packaging, but chose to not redeem the paid deposit. However, there is no accurate basis to determine or simulate these "lost" volumes. Please note: In this report, collection rates are calculated against the declared volumes of put on market beverage packaging. 	"*Please note: In this report, collection rates are calculated against the declared volumes of put on market beverage packaging.*" it is essential to look critically at those figures and to look at the amount which is found in litter currently "***selective collection***" in the public blue bin scenario. ● *What are the current collection rates*? Key to know them to compare the impact of changes.

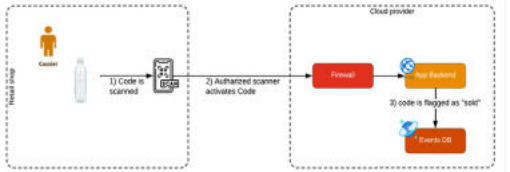
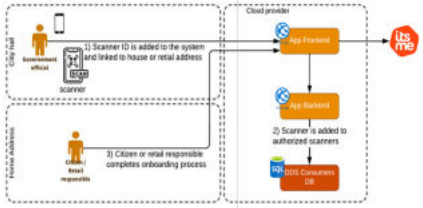
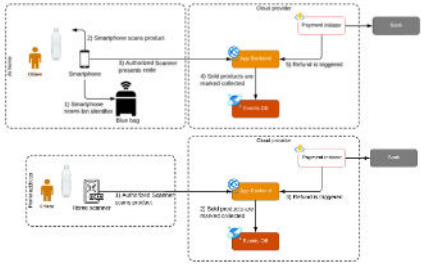
	Collection options			
	Blue bag	**Public blue bin**	**Smart bin**	**Public bin (temporary)**
Existing waste operations to leverage for DDRS?	Yes, Fost plus system	TBD	TBD	Yes, public bin management by local authorities
Operations partner	Fost plus (existing agreements)	TBD	TBD	Public authorities
Separate collection route needed for DDRS flow?	No	Yes	Yes	No

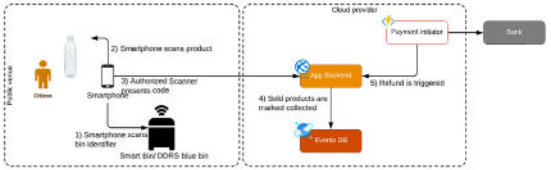
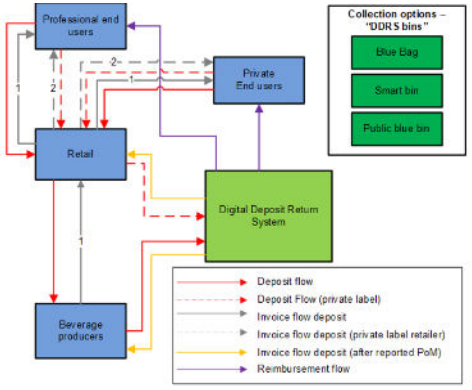
	For the DDRS, we include aim to achieve the collection rates presented on the right. • As a starting point, we have included the rates communicated in the RfP documents. • The endpoint is determined in reference to the collection rates of the DRS in Germany. The German DRS is considered as the most performant in the EU. In the context of DDRS, we aim to achieve the highest rates possible. We progress linearly from the start to end in terms of performance. **Please note**: In reality, collection rates are measured to indicate the performance of the system year by year. In the DDRS model, collection rates are an input variable to estimate the related costs. This means that the volumes presented on the right will change according to the collection rate. *We have included a sensitivity analysis (Financial layer) to illustrate the impact of incremental changes to collection rates on volumes collected and cost.* **Input: Overall collection success rate** PET / Steel / Alu 2023: 89.00% / 95.00% / 95.00% ... 2032: 97.00% / 99.00% / 99.00% **Output: Tonnage collected (not collected) rounded** PET / Steel / Alu 2023: 45,640 (5,642) / 7,566 (398) / 20,924 (1,101) ... 2032: 49,742 (1,538) / 7,884 (80) / 21,805 (220)	
38-39	C. DDRS Material flow - Allocation of scoped beverage packaging across DDRS collection options by year **Key Observations - Output based on collection success** • The majority of beverage packaging units will be collected through the blue bag system. Over time we observe a slight increase in the number of units. • The fraction collected through public infrastructure increases over time, as the littered fraction decreases. • The beverage packaging units collected through the normal public waste bins decreases according to the implementation of the public blue bins. **Please note:** The model uses conversion rates to estimate the number of units based on the declared weight of the identified fractions: • PET (focus on <3l for conversion): 15.8 gr • Aluminium: 12.5 gr • Steel: 26.2 gr *Please see the next page for an overview of in weight for each fraction.*  	No comment at this stage
40	Items to be further determined	Clearly impossible to determine all of this within the span of one year. Besides those: • Risk of fraud / failed redeeming • Consumer participation levels • DDRS blue bins = can the material count as separately collected • Potential for reuse • Risk of contamination and attraction of other types of waste

		• "***Alternative in case there is no willingness of municipalities to collaborate in the context of DDRS***": this is a determining element which risks to make the whole D-DRS proposition fall short. In the Netherlands, municipalities clearly closed the door to having collection points set up on public spaces. VVSG already indicated during the hearings in the Flemish Parliament (Oct 2022) that it cannot be that the public space is used for collection.
II) Technology layer (41- 55)		
43		• *Refund with as little clicks (process steps) as possible*: Nothing is said about a minimum amount of scanned packaging to get back money on a bank account. It is very important to know whether a consumer can reclaim his/her deposit after each package scanned, or whether there is a minimum amount (this would be problematic for tourists, or people on very low incomes for whom every euro counts). • *Should be responsive at all times*: *what about absence of data/wi-fi?* • *What about this 'verified location' stuff?* • *Backend infrastructure needs to handle a very large amount of requests*: environmental and economic cost of such a backend infrastructure? • *GDPR compliant*: *how? And is that in itself enough*? • Also: each smartphone (also with poor camera's) should be able to scan the QR-code
44		• Geolocalisation = still need to assume consumer acceptance (providing home address is far from being something everyone wants to do). Plus, geolocalisation 50m from the home address doesn't imply correct disposal (e.g. someone deactivating the code of his/her bottle to avoid the burden of having to redeem outside of home but then discarding the packaging on-the-go. • "*Have some basic information about previous activities*" = consumer acceptance? • Solution architecture is extremely complex and potentially energy intensive.
45	B Weighing of the Click	No specific comment. But the fact that it is a clear conflict of interest highlights how 'pro-DDRS' the study inherently is.

	In function of the weighing exercise, we have engaged with the developers of the Click (Unbox). We have asked them to review the defined criteria and to provide their input. In summary, the **Unbox platform is able to provide the functionalities needed for the DDRS**: • Defined principles for DDRS are aligned with the Unbox standards • Unbox will be able to scale (handling of requests) as required • All requirements for the DDRS application and solution architecture are possible with Unbox  Technology layer - Listing of criteria for the DDRS Principles Technology layer - Listing of criteria for the DDRS Criteria – Solution architecture  Technology layer - Listing of criteria for the DDRS Criteria – Smartphone app	*Also, what does 'Possible with Unbox' means? Can it be operational to be tested in 2023 and ready in 2025?*
46	C Architectural design - introduction 1 Central system hosted in a public cloud holding all the intelligence and managing all components (i.e. app, scanners, smart bins). 2 Simple interface where producers can upload their unique codes into the Digital Deposit Return System (DDRS). 3 Data spread across different databases to ensure GDPR compliance (e.g. codes DB, event DB, citizen, retailer and producer DBs). 	
47	C Architectural design - components **Main Elements** **Retail** Codes are activated at PoS during checkout so that the deposit can be reclaimed (adapted to cashier system or via separate retail scanner for DDRS). **Citizen** Use of a smartphone app to reclaim deposit. Initiation includes providing some basic information (e.g. address and bank details) and authentication using ItsMe. **Public Venue/ public blue bins** Disposal at public blue bins is done using the DDRS app by scanning the bin unique identifier together with the bottle/ can unique identifier.  **Secondary Elements** • Databases: Producers, Retailers, Consumers, Events • APIs: Producers, Retailers, Consumers • ItsMe, Banking apps, PowerBI, etc. • Application Gateway • API Manager • Load Balancer • Administrator Application • App Frontend • App Backend • Payment initiator • Janitor • Redis Cache • Archive • Key Vault	**Retail**: quid cost of training? What if the scan is not okay: a)product cannot be sold? b) No deposit paid by consumer? **Citizen**: *quid people without bank account? How to set it up on home scanners (also if changes needed later in time) / what if authentication fails?*
48	C Architectural design - Security system	• "*The central system should be set up at a well-known cloud provider that has already proven to be able to offer sufficient protection*." > does that even exist?

	The system is conceptually designed to minimise risks: • Only a minimum of information is transmitted between the various components. This is often no more than a serial number and a scanner ID. • The endpoints are as 'dumb' as possible, while all the intelligence is managed centrally. • The central system should be set up at a well-known cloud provider that has already proven to be able to offer sufficient protection. • Various security layers are used to counter attacks (Firewall, Web application firewall, API Manager). • The system is modular so that the failure of one component cannot lead to a catastrophic break down. • Different databases are used to be able to separate the information both logically and physically. • The components responsible for the financial transactions are not accessible via a network. They are stand-alone and can only be manipulated by a Cloud Administrator. • Serverless components are used, which are all kept up to date by the cloud provider. Please note: The information uploaded to the system is not freely accessible by the parties involved (producers, retailers). Specifically, producers and retailers will not be able to access the data of others.	• Information uploaded: *but will producers and retailers be able to access the information of consumers?*
49	D Design principles - Product registration process **Unique Product Coding** Every producer will need to print unique codes on the bottles or cans. No decision has been made on the entity that will manage these codes. This activity can be integrated in the DDRS organisation or outsourced (practical or cost considerations). Producers of bottles and cans will need to register their products in the DDRS. They can do this either by uploading them automatically via an integration (API; 1a) or manually into DDRS using the website (1b).  **Process description** A. Producer uploads a list of products into DDRS*. This can be done manually using the website or automatically using an integration B. DDRS registers those products in the system and marks them as 'Produced'. This means that at this moment they can be bought. Their location is presumed to be in a retail store. *Minimally producers upload the product codes (numbers identifying a specific bottle or can). The meaning behind those number are subject to discussion or industry standards, as is currently the case for barcodes.	*Quid cost small producers?* (See Annex later)
50	D Design principles - Product registration process: unique codes Square (01)07612345678900 (17)100503 (10)AC3453G3 (21)123 Rectangle **GS1 DataMatrix (preferred data carrier*)** GS1 DataMatrix is a matrix (2D or two-dimensional) barcode which may be printed as a square or rectangular symbol made up of individual dots or squares. This representation is an ordered grid of dark and light dots bordered by a finder pattern. **Considerations for DDRS** • Solution must follow GS1 standards • Data structure: GS1 Serialized Global Trade Item Number (sGTIN) • Replaces current barcode (!) • Producers to specify and verify limits (e.g. cans) *A data carrier is a graphical representation of data in a machine readable form, used to enable automatic reading of the Element Strings. **GS1 element strings** AI | Data definition | Format (AI & data)* 01 | GTIN | N2+N14 10 | Batch or lot number | N2+X..20 11 | Production date (YYMMDD) | N2+N6 15 | Best before date (YYMMDD) | N2+N6 17 | Expiration date (YYMMDD) | N2+N6 21 | Serial number | N2+X..20 *** Meaning of the format used** Format | Meaning N | Numeric digit X | Alphanumeric characters N2 | Fixed length of two numeric digits X...20 | Variable length with a maximum of 20 alphanumeric char. Adapted from GS1 DataMatrix Guidelines	
51	D Design principles - Product vending process	*What about fraud risk (not mentioned in the slide): Employee of supermarket using the home scanner to activate and deactivate many codes?*

	Product Activation and Fraud Prevention Once bottles/ cans are at PoS, they are ready to be purchased (i.e. to be activated). At time of purchase, a consumer has paid a deposit for their beverage packaging, so it is important that they are flagged as such. Once the bottles or cans are scanned by the retail scanner, they are marked as "Sold". This means that they are ready for return/ refund. This now leaves a door open for fraud: the frauder might buy bottles/cans and scan them all using the home scanner, triggering the refund process. But, instead of actually throwing them in the correct bin, he might try to return the products to get refunded the full price (including deposit) as well as the individual deposits reclaimed via the scanner. A failsafe will need to be designed to block this.  **Process description** A. The cashier scans the products using the authorized retail scanner. B. The scanner sends information that the product was purchased to DDRS C. DDRS marks the individual bottles and cans as "Sold" **Fraud prevention** The retail scanner could also be used to scan returned products. If the deposits of the products would already have been reclaimed, the store could refuse to take them back.	
52	D Design principles - Scanner initialization process **There will be 2 types of scanners** ➢ **Retail scanners** will scan bottles and cans to activate the code in DDRS upon purchase. This includes retailers, shops and e-commerce. ➢ **Home scanners** will scan bottles and cans to trigger deposit refunds and to scan returned products (deactivation) To make sure scanners are properly activated, an official instance will take care of it. This can be done by a government official, or the DDRS organisation. The reason for using municipal administrative functions (e.g. handling citizens moving house) is that it would leverage existing infrastructure known by the consumer. From that perspective, it could signal trust and be more efficient.  **Process description** A. The government official takes a new scanner and registers it in the DDRS system using the DDRS Website. The scanner is attributed to an address and primary user. B. The DDRS activates the scanner in the system. Calls coming from this scanner will as of now be accepted. C. The citizen or retailer will complete their account in the DDRS by adding all missing information. Authentication can be accomplished using ItsMe, or an ID card reader. This can be done via the DDRS website or App. Once all information is filled in, the DDRS system can initialize refunds. This process is valid for additional identification technologies, like an NFC token (Near Field Communication).	"*Official instance will take care of it. This can be done by a government official, or the DDRS organisation*" > using 'municipal administration' puts a very large pressure on public authorities and there takes part of the burden away from the industry. "*Citizens or retailers will complete their account*" > not suitable for digitally impaired (even if home-scanner).
53	D Design - principles Process disposal at home **Post-purchase, post-consumption - At home** Now that bottles and cans have been bought and have been consumed, they can be returned. At home, products need to be scanned via the smartphone app or home scanner and deposited into the correct waste bin (blue bag). In order to allow a grace period in which the products can be returned to the store, we will delay payment. For example, 1 month. By implementing this delay we make sure that products are not bought, scanned and immediately returned to the retail store. **Smartphone example** **Home scanner example**  **Process description** A. Citizens scan the used bottle or can using the activated home scanner. The scanner sends the information to the DDRS system, which checks the status of the product. B. If applicable the DDRS system marks the product as "Collected" C. DDRS triggers a refund (in due time) towards the citizen.	"*In order to allow a grace period in which the products can be returned to the store, we will delay payment. For example, 1 month. By implementing this delay we make sure that products are not bought, scanned and immediately returned to the retail store.*" > delayed payment of 1-month is huge for consumers, especially with a lower income. This also makes the system very complex and annoying for any tourist. • *What about fraud?* Delayed repayment prevents potential return to shop. But consumers could redeem all deposits when coming back from the store without having consumed the product. • And again, quid of digital impairment, also with home scanner (no support in case of difficulties redeeming the deposit).
54	Disposal on-the-go	• *Is the delay of refund also one month?*

	Post-purchase, post-consumption - On the go Bottles and cans that are consumed in public places or away from home also need to be collected. For this purpose, a number of public blue bins are placed in public places like parks and city halls. Direct refunding using public blue bins is not possible. It would be too complex to have consumers identify themselves towards the smart bins. Therefore, the smartphone will be used to scan the product, and the refund will be triggered by the smartphone.  **Process description** A. Consumer opens the smart bin using a smartphone B. Consumer scans the product(s) that will be dropped in the smart bin C. The smartphone sends the product codes to the DDRS system for verification D. The (valid) products are marked as collected in the DDRS system E. A refund is triggered in the DDRS system	• Still appears that the 'public blue bins' are <u>not</u> smart bins but simply regular bins painted in blue with a 2D-code / NFC tag. In the case of a mix, it will create a lot of confusion among consumers on how to use the on-the-go system • *What about fraud / misuse?* *a) If the bin is full, consumers might simply discard the packaging, it would then become litter.* *b) What if the consumer simply deactivate the 2D-code at the first bin he/she crosses when coming out of the point of sale*?
55	Items to be further discuss **Items** Unique codes: • Industry-wide agreement is needed on data structure ("numbers behind the datamatrix") • Unique code management needs to be clarified, specifically who will be responsible for avoiding duplicates and timeframe in data retention policy Registration of unique codes: • Clearly defined scope regarding the scoped beverage packaging • The responsible party for the registration of unique codes is to be identified, specific challenges regarding: ○ Impact on producers without automatic integration (API) Home scanner: • Identification of scanner manufacturer based on needed hardware (in annex) • Practicalities regarding distribution of home scanners (partnerships, cost, etc.) Retail scanner: • Identification of scanner manufacturer based on needed hardware (in annex) • Practicalities regarding distribution of retail scanners (partnerships, cost, etc.)	On top of the existing items: - *How to minimize fraud and misuse* (retail, home, on-the-go)? - *How to make the system accessible to tourists, digitally impaired (home-scanner is not a good enough solution at this stage)*? - *How to 100% ensure data security*?
III) Financial Layer (56-90) see calculations here		
58	A DDRS Deposit Flow **Deposit flow** 1. Beverage producers invoice deposit (1) 2. Retailers forward deposit (1) in their invoice 3. Retailers invoice deposit (2) for private label 4. End-users pay deposit to seller 5. DDRS invoice deposit to retailers & beverage producers based on their respective PoM 6. Beverage producers & Retailers (for private label) pay deposit amount to DDRS organisation based on PoM 7. DDRS organisation reimburses deposit to consumers at time of correct disposal Financing flow is managed centrally by the DDRS organisation. Producers and retailers (or sellers) do not refund consumers directly. Intermediate actors were omitted from this visual to improve readability. For a description of deposit flows of other deposit return systems, we like to refer to this report. It contains a visual for each country within the EU.  Professional end users Private End users Retail Beverage producers Digital Deposit Return System Collection options – "DDRS bins" Blue Bag Smart bin Public blue bin Deposit flow Deposit Flow (private label) Invoice flow deposit Invoice flow deposit (private label retailer) Invoice flow deposit (after reported PoM) Reimbursement flow	Without more <u>commitment of retailers</u> (as seller, not producer), the system risks being imbalanced with too little incentive for retailers to 'do their work well'. In a RTR-DRS there is a handling fee and financial investments which 'force' retailers to take part in the system and motivate them to be part of it. So far the only liability they have is the '*forwarding of the deposit in their invoice*' (2.)

59	**B Cost simulation - overview** **Three objectives of the model** 1. Develop the operational strategy at the optimal cost 2. Calculate the deposit (short/ long term) 3. Develop basis for financing strategy (the reserve – long/short term) The model was applied to a **Digital DRS (DDRS)**, as well as a **Classic DRS (DRS)**. We will distinguish between both models throughout the next section. **Steps under this section** Data classification → Scenario modelling → Results	
60	**B Cost simulation - Data classification and processing** **Data received:** • Declared packaging for 2021 in weight & unit by material • PMD - Collected: Collected tonnages of PMD (blue bag) by IC & municipality for 2021 • Production figures: Sorted PMD in weight (per IC, group) **Steps taken:** 1. Consolidate the volumes collected and sorted on IC-level for the fractions of interest (PET, Alu, Steel) – Grouped sorting figures (volumes for multiple ICs) were allocated based on their contribution to the total PMD collected. 2. Allocate volumes per fraction to municipalities based on their share of collected PMD against the total PMD collected at IC-level – For NET Brussel, we had to allocate the volumes based on inhabitants. 3. Apply correction to reflect only beverage packaging (based on declared packaging) 4. Converge weight to units 5. Estimate "not collected" against declared packaging **Disclaimer - data restraints** • New blue bag was implemented for all citizens in Q4 2021 (Transition to P+MD). 2021 volumes of P+ well below current volumes. • Combination of mainly old and only a few sorting plants, which has impact on cost and operational efficiency. Additionally, not all sorting plants sorted in 14 fractions. • Allocation of sorting costs based on Business plans of the contracted sorting centers (not operational data), resulting in underestimations for some fractions (e.g. clear PET), and overestimations for others (e.g. metals)	• *Is there any distinction between collection and "selective" collection in the data received? What data did they got (collection figures in Belgium not public at this point)* • *Were the declared packaging on the market questioned at any point in the scenario?* • *Which data were used for the classical DRS scenario*?
61 - 62	**B Cost simulation Scenario modeling: allocation of collection point** In the original DDRS blueprint report, we included scenario 1. Based on the feedback, we have created scenario 2 and adapted the model accordingly. In this scenario, the collection points out-of-home are aligned with the estimated number of public bins. Additionally, a scenario was requested with a maximum number of RVMs (nl. 10,000 max.). From a methodological point of view, the costs associated with a specific scenario can only compared to its counterpart with the same restrictions & criteria. The group has decided to only compare DDRS-Sc.2 to DRS-Sc.3. **Model output: Total collection points & average distance** Scenario / DDRS / DRS Sc.1 — **Calculation on the same access for consumers (only geographic):** Minimum number of collection points based on km street per TO — 190,649 collection points 811 meters on average — 190,370 collection points 812 meters on average Sc.2 — **Public bin restraint:** Collection points equal to est. number of public bins — 136,405 collection points 1.13 km on average — 136,405 collection points 1.13 km on average Sc.3 — **Request from blueprint feedback:** Max number of collection points is 10,000 — N/A — 9,464 collection points 16.33 km on average	• *Why did scenario 3 for DRS got selected? Why a restriction at 10.000 collection points, and what are those collection points (supermarket, gas stations… how many RVMs…)*? • "*From a methodological point of view, the costs associated with a specific scenario can only compared to its counterpart with the same restrictions & criteria*". > *So why did scenario 2 (D-DRS) and 3 (DRS) got compared*?

	Operational strategy: Find the optimal collection strategy for each municipality to collect the "not collected" at minimal cost **Basis:** Total cost = OpEx (collection, logistics and treatment cost) + CapEx (investment cost) Optimization technique will be used to guarantee the **minimal cost with respect to the defined constraints** Optimization technique considers 3 elements: 1. **Objective** (goal) function – Total Cost 2. **Decision variables** – Number of bins of different collection equipment 3. **Constraints** – Total number of collection points per municipality Our model has **multiple parameters**: 1. **Frequency** of collection (yearly) 2. **Access** to collection point (per km) 3. **CapEx** – Investment cost of equipment 4. **OpEx** – Cost of collection, transportation and treatment of waste The outcome of the model will tell us: Given "X" frequency of collection, for each municipality, we would need "Y" number of "Z" collection option in order to collect all of the waste while minimizing the total cost. Additional cost elements were added after allocation of collection points.	
63	B Cost simulation - Description of cost elements D-DRS (1/2) **DDRS - Digital Deposit Return System** **Name** / **Description** **Investment cost** Public blue bin (all types) – Cost of acquiring and placement of various types of public blue bins (normal, smart bins). Cost is allocated to the year of implementation. Bin stickers – Cost for bin identifiers (needed to redeem deposit), accounting periodic replacement. Cost is allocated to the year of implementation. Scanners – Scanners to deploy as home- or retail-scanner (same investment cost), based on 27.50 € per scanner & estimated need for households (555K) IT Development – Project cost to build and deploy the DDRS solution, estimated by PwC **Operational cost** Blue bag collection & sorting – Cost related to blue bag operations of collection & sorting by fraction. Based on the total cost for collection & sorting in 2021 and applied to the volumes collected through the blue bag "Public bin" collection cost – Cost for emptying public bins (Incl. personnel cost, TCO material, est. time for emptying & movement between bins), based on EPR litter simulation (corrected for other fractions). Applied to the frequency of collection. "Public blue bin" collection cost – Cost for emptying public bins (Incl. personnel cost, TCO material, est. time for emptying & movement between bins), based on EPR litter simulation. Applied to the frequency of collection. Maintenance cost – Yearly cost for maintenance of DDRS collection points (public blue bins), calculated per bin per year based on investment cost (10%). Pre-sorting – Cost for sorting out non-PMD fractions, based on EPR litter simulation. Applied to volumes collected through public bins (transition) Post-sorting – Cost for sorting PMD fractions, based on EPR litter simulation. Applied to volumes collected through public bins (transition) and "public blue bins". Outbound transport cost – Additional transport cost to cover transportation after consolidation point. Applied to volumes collected through public bins (transition) and "public blue bins". Litter cost – Estimated cost related to the not collected volumes, based on the total litter cost (EPR litter simulation) **Revenues** Recycling revenue – The estimated net income from PET, aluminium and steel applied to volumes collected (public and blue bag). Unredeemed deposits – Estimated income from not collected beverage packaging (20 euro cents per packaging unit) **Please note:** Operational cost include those cost directly related to the execution of an activity. We have not included any form of overhead. To estimate the cost for overhead, 15% can be applied to the total cost as reference. We have also not included indirect costs or cost for adaptation at the side of the producers (e.g. printing operations) and retailers (e.g. update cashier solutions). DDRS Blueprint - Report PwC 2022 53	• *Costs linked to home scanner and the whole smartphone interface: payment of public authorities in charge of setting up the home scanner, user support, app development and maintenance etc. Are those included in the IT development*? Those are different from the simple 'scanners' cost. • *Cost NFC for the public bins*? • *Cost of cleaning public spaces around the public bins*? • *Cost in supermarkets of activating the code for employees*?
64	B Cost simulation - Description of cost elements DRS (2/2) **DRS - Deposit Return System** **Name** / **Description** **Investment cost** RVM investment – Cost of acquiring Reverse Vending Machines. Cost is allocated to the year of implementation (first year). **Operational cost** Operational cost* – Cost per unit collected including • Exploitation (building) cost • Day2day emptying, cleaning, management,... • Handling cost of "returning deposit" • Transport cost • Cost related to "retourcentra" (incl. reception, processing, storage, outgoing transport) Maintenance cost – Yearly cost for maintenance of RVMs, calculated per RVM per year based on investment cost (10%). Litter cost – Estimated cost related to the not collected volumes, based on the total litter cost (EPR litter simulation) **Revenues** Recycling revenue – The estimated net income from PET, aluminium and steel applied to volumes collected (public and blue bag). Unredeemed deposits – Estimated income from not collected beverage packaging (20 euro cents per packaging unit) * Depending on the implementation strategy and organisation of take-back, it is possible there is an additional need for sorting and counting centres. This cost is currently not included. **Please note:** Operational cost include those cost directly related to the execution of an activity. We have not included any form of overhead. To estimate the cost for overhead, 15% can be applied to the total cost as reference. We have also not included indirect costs or cost for adaptation at the side of the producers (e.g. printing operations) and retailers (e.g. rearrangements at PoS).	• *Exploitation (building) cost*: why isn't this cost also present in case of public space? • '*Handling cost of returning deposit*'? What is this cost exactly? • Below the table are indicated that potential additional need for sorting and counting centres is not included. Then what do the *'OpEx: Cost related to 'retourcentra"* correspond to in the table?

65	B Cost simulation - Results: investment costs **Digital Deposit Return System (Sc.2)** **Deposit Return System (Sc.3)** 	D-DRS: the amount of 'smart bins' is only 138 for the whole of Belgium. The rest only consist in 'Public blue bins' which are simple bins • *Why is the investment cost of the traflux bins at 750€ in the cost analysis, while in the benchmark (slide 28) the investment + placement cost was 1250 to 1450€ per bin*?
66	B Cost simulation - Results: Investment costs (2/4) **Digital Deposit Return System (Sc.2)** **Q:** How much would it cost to provide all households with a home scanner? **A:** 138,183,402.50 € **Q:** How much would it cost if you use NFC tags as well? **A:** 147,317.40 € **Please note:** these costs would replace what it currently included in the table, not in addition to the cost.	• If including the lower price of those **Traflux PILLAR bins** (1250€ instead of 750€ for investment + placement estimated in the benchmark slide 28), the cost (136.267*1250 = 170.333.750 vs 102.200.250 calculated) so already a difference in investment costs of almost 68 millions (**68.133.500€**). • **The cost of scanners** at the moment is of 15.260.712,69€, which corresponds to 554.935 scanners (27.5€ per unit), the number of home scanner needed for all the households is 5.024.851 (138.183.402,5/27,5). So in the evaluated scenario, only **11% of the population has those home scanners**. This seems a very low coverage given potential refusal of users to use smartphone apps, digital impairment (if the home scanners would even fix this issue), home scanners for families with childrens (so they can take part in the system as well…). The exclusion of those costs therefore risk flawing the effectiveness of the system. • Cost of NFC tags is 4 times higher than the one of the simple bin scanners (147.317,40/36.827). The exclusion of those costs therefore risks flawing the result by 110.490,4€. • Generally speaking, without more smart bins, the likelihood of this system to have a sufficient impact on out-of-home consumption seems very unlikely.
67	B Cost simulation - Results: Investment cost (3/4)	

Digital Deposit Return System (Sc.2)

	Public blue bin (simple)	Smart bin - Small	Smart bin - Big	Smart bin - Big compr.
Reference model	Traflux - Pillar	Big Belly	Big Belly	Big Belly
Investment cost	750.00 €	1,200.00 €	3,000.00 €	4,500.00 €
Capacity (liters)	100 L	190 L	570 L	570 L
Number allocated	136,267	120	8	10

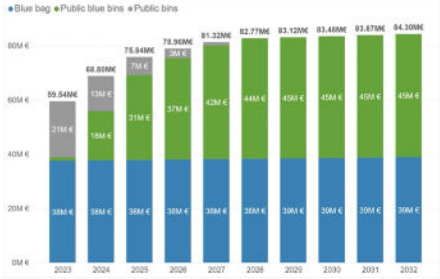
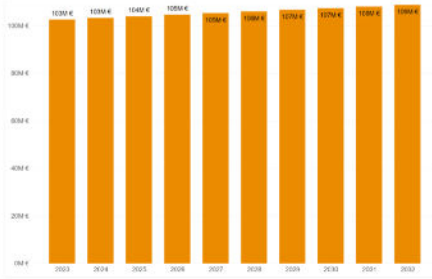
Deposit Return System (Sc.3)

	RVM - Single	RVM - Double
Reference model	Tomra - T70 Single	Tomra - T70 Dual
Investment cost	14,500.00 €	23,000.00 €
Capacity (liters)	490 L	760 L
Number allocated (Sc.3)	8,209	1,558

Digital Deposit Return System (Sc.2)

Region	Smart Bins - small	Smart Bins - Big	Smart Bins - Big compressed	Public blue bin (simple)
Vlaanderen	119	8	10	79,475
Wallonië	1	0	0	43,373
Brussel	0	0	0	13,419
Total	120	8	10	136,267

Year	Public blue bins (all types)	Bin stickers	Scanners	IT development	Total investment
2023	0 €	0 €	15,260,712.69 €	€ 775,701.00	16,036,413.69 €
2024	40,597,050 €	14,614 €	0.00 €	€ 0.00	40,611,664.00 €
2025	31,617,750 €	11,363 €	0.00 €	€ 0.00	31,629,113.00 €
2026	14,273,400 €	5,132 €	0.00 €	€ 0.00	14,278,532.00 €
2027	10,320,450 €	3,705 €	0.00 €	€ 0.00	10,324,155.00 €
2028	5,604,600 €	2,013 €	0.00 €	€ 0.00	5,606,613.00 €
2029	0 €	0 €	0.00 €	€ 0.00	0.00 €
2030	0 €	0 €	0.00 €	€ 0.00	0.00 €
2031	0 €	0 €	0.00 €	€ 0.00	0.00 €
2032	0 €	0 €	0.00 €	€ 0.00	0.00 €
Total	102,413,250 €	36,827 €	15,260,712.69 €	€ 775,701.00	118,486,490.69 €

	Deposit Return System (Sc.3) **Year / RVM investment** 2023: 154,864,500 € 2024: 0 € 2025: 0 € 2026: 0 € 2027: 0 € 2028: 0 € 2029: 0 € 2030: 0 € 2031: 0 € 2032: 0 € Total: 154,864,500 € **Region / RVM - double / RVM - single** Brussel: 127 / 528 Vlaanderen: 946 / 5,087 Wallonië: 485 / 2,594 Total: 1,558 / 8,209 Depending on the implementation strategy and organisation of take-back, it is possible there is an additional need for sorting and counting centres. Both the investment cost and operational costs related to these activities for DRS were not included in the calculation.	
68	B Cost simulation - Results: investment costs (4/4) **DDRS vs. DRS - Conclusion** Assuming the cost is borne centrally, the total investment cost for DDRS (Sc.2) is lower compared to DRS (Sc.3). Additionally, there are more collection points available for the consumer under DDRS, compared to DRS (considering the option of disposal at home). This means a consumer will have to travel a lower distance before encountering a collection points under DDRS compared to DRS (Sc.3). DDRS provides more comfort and access to the consumer at a lower investment cost. **Model output: Total investment cost over simulated period** Sc.2 – Public bin restraint: Collection points equal to est. number of public bins: DDRS 118,486,490.69 € Sc.3 – Request from blueprint feedback: Max number of collection points is 10,000: DRS 154,864,500.00 €	If taking into account the correction in investment costs mentioned above for D-DRS for the cost of public blue bins (68.133.500€), NFC (+110.490,4€), the investments costs for D-DRS already go up to **186.730.481,09€** and are therefore higher than the ones of DRS.
69	B Cost simulation - Results: Operational cost (1/4) *As the operational cost is driven by collection rates, below reflects the outcome of both model with equal collection rates, as described in "I. Technical Layer"* **Digital Deposit Return System (Sc.2)**	
		
	Deposit Return System (Sc.3) 	
	Please note: Operational cost include those cost directly related to the execution of an activity. We have not included any form of overhead. To estimate the cost for overhead, 15% can be applied to the total cost as reference. We have also not included indirect costs or cost for adaptation at the side of the producers (e.g. printing operations) and retailers (e.g. update cashier solutions).	
70	B Cost simulation - Results: operational costs D-DRS (2/4)	• The collection costs of the 'public blue bins' seem quite low given the amount of public blue bins there would be. *Is it feasible to have such a 'low' cost for potentially more frequent collection which needs to be separated from the 'classic public bins' (at least by means of a truck with different compartments if not by different trucks)*?

	As the operational cost is driven by collection rates, below reflects the outcome of both model with equal collection rates, as described in "I. Technical Layer" **Digital Deposit Return System (Sc.2)** | Year	Blue bag - Collection & Sorting	Public bins - collection cost	Pre-sorting	Public blue bins - collection cost	Maintenance cost	Post-sorting	Outbound transport cost	IT recurrent	Yearly Operational cost	Recycling revenue	Net OpEx
---	---	---	---	---	---	---	---	---	---	---	---
2023	37,653,407.35 €	13,506,428.95 €	5,633,486.06 €	0 €	0 €	1,219,941.12 €	233,109.77 €	1,292,760.00 €	59,539,133.25 €	46,903,918.60 €	12,635,214.65 €
2024	37,796,209.65 €	8,394,872.07 €	3,569,416.98 €	12,175,272 €	4,059,705 €	1,273,099.72 €	243,267.46 €	1,292,760.00 €	68,804,602.88 €	47,253,268.79 €	21,551,334.09 €
2025	37,939,011.94 €	4,256,510.86 €	1,853,006.75 €	21,695,452 €	7,221,480 €	1,326,258.32 €	253,425.16 €	1,292,760.00 €	75,837,905.04 €	47,602,618.98 €	28,235,286.05 €
2026	38,081,814.24 €	2,234,310.89 €	969,406.50 €	26,086,941 €	8,648,820 €	1,379,416.95 €	263,582.86 €	1,292,760.00 €	78,957,052.43 €	47,951,969.17 €	31,005,083.26 €
2027	38,224,616.54 €	781,458.46 €	337,880.14 €	29,293,009 €	9,680,865 €	1,432,575.59 €	273,740.56 €	1,292,760.00 €	81,316,905.29 €	48,301,319.36 €	33,015,585.93 €
2028	38,367,418.84 €	0.00 €	0.00 €	31,098,493 €	10,241,325 €	1,485,734.22 €	283,898.26 €	1,292,760.00 €	82,769,629.31 €	48,650,669.55 €	34,118,959.76 €
2029	38,510,221.14 €	0.00 €	0.00 €	31,239,937 €	10,241,325 €	1,538,892.83 €	294,055.95 €	1,292,760.00 €	83,117,191.92 €	49,000,019.74 €	34,117,172.18 €
2030	38,653,023.44 €	0.00 €	0.00 €	31,399,510 €	10,241,325 €	1,592,051.44 €	304,213.65 €	1,292,760.00 €	83,482,883.53 €	49,349,369.93 €	34,133,513.60 €
2031	38,795,825.74 €	0.00 €	0.00 €	31,578,853 €	10,241,325 €	1,645,210.05 €	314,371.35 €	1,292,760.00 €	83,868,345.13 €	49,698,720.12 €	34,169,625.01 €
2032	38,938,628.03 €	0.00 €	0.00 €	31,806,660 €	10,241,325 €	1,698,368.65 €	324,529.04 €	1,292,760.00 €	84,302,276.72 €	50,048,070.31 €	34,254,206.41 €
Total	382,960,176.91 €	29,173,581.23 €	12,363,196.43 €	246,374,127 €	80,817,495 €	14,591,548.89 €	2,788,194.05 €	12,927,600.00 €	781,995,819.50 €	484,759,944.57 €	297,235,974.94 € | **Please note:** Operational cost include those cost directly related to the execution of an activity. We have not included any form of overhead. To estimate the cost for overhead, 15% can be applied to the total cost as reference. We have also not included indirect costs or cost for adaptation at the side of the producers (e.g. printing operations) and retailers (e.g. update cashier solutions).	• The transfer of the pre-sorting cost to post-sorting bins in 2027 seems to have been forgotten: in 2027, the pre-sorting costs (which are calculated for the 'classic public bins' simply disappears (more than 337.000€) while that same year the cost of post-sorting (Defined slide 63 as) "*Cost for sorting PMD fractions, based on EPR litter simulation. Applied to volumes collected through public bins (transition) and "public blue bins*". only increases by about 53.000€. *How can that be explained*? • *Detail of the maintenance / IT cost*? • *Quid operational cost of cleaning the public spaces*? This should be factored in given the risk of extra public bins to attract more litter. • **Recycling revenues** are here the same as for the DRS scenario. Given higher risks of contamination in the D-DRS scenario, the quality of the recyclate (and therefore its selling price) will be lower. *Has the contamination factor been taken into consideration?*
71	B Cost simulation - Operational costs DRS (3/4) *As the operational cost is driven by collection rates, below reflects the outcome of both model with equal collection rates, as described in "I. Technical Layer"* **Deposit Return System (Sc.3)** 	Year	Operational cost	Maintenance cost	Yearly OpEx	Recycling revenue	Net OpEx
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2023	87,119,748.66 €	15,486,450 €	102,606,198.66 €	46,903,918.60 €	55,702,280.05 €
2024	87,802,754.72 €	15,486,450 €	103,289,204.72 €	47,253,268.79 €	56,035,935.93 €
2025	88,485,760.59 €	15,486,450 €	103,972,210.59 €	47,602,618.98 €	56,369,591.61 €
2026	89,168,766.14 €	15,486,450 €	104,655,216.14 €	47,951,969.17 €	56,703,246.97 €
2027	89,851,772.30 €	15,486,450 €	105,338,222.30 €	48,301,319.36 €	57,036,902.94 €
2028	90,534,778.15 €	15,486,450 €	106,021,228.15 €	48,650,669.55 €	57,370,558.60 €
2029	91,217,784.08 €	15,486,450 €	106,704,234.08 €	49,000,019.74 €	57,704,214.33 €
2030	91,900,789.77 €	15,486,450 €	107,387,239.77 €	49,349,369.93 €	58,037,869.84 €
2031	92,583,795.62 €	15,486,450 €	108,070,245.62 €	49,698,720.12 €	58,371,525.50 €
2032	93,266,801.33 €	15,486,450 €	108,753,251.33 €	50,048,070.31 €	58,705,181.02 €
Total	901,932,751.36 €	154,864,500 €	1,056,797,251.36 €	484,759,944.57 €	572,037,306.79 €	 * Depending on the implementation strategy and organisation of take-back, it is possible there is an additional need for sorting and counting centres. Based on the cost for sorting from a previous study, this additional operational cost is estimated at 20,5 mio euros per year. **Please note:** Operational cost include those cost directly related to the execution of an activity. We have not included any form of overhead. To estimate the cost for overhead, 15% can be applied to the total cost as reference. We have also not included indirect costs or cost for adaptation at the side of the producers (e.g. printing operations) and retailers (e.g. update cashier solutions).	• Maintenance cost per year for the RVMs is estimated at 15.486.450€, meaning = 1585,89€ per machine (15.486.450/(8.209+1.558)). • *Detail of the operational costs?* • In general, it is surprising to have such imbalance in the cost benefit given the results of the OVAM impact analysis of 2015. *Where do the data used for the estimation of the costs come from?*
72	B Cost simulation - Operational cost comparison (4/4) *As the operational cost is driven by collection rates, below reflects the outcome of both model with equal collection rates, as described in "I. Technical Layer"* **DDRS vs. DRS - Conclusion** The total net operational cost over the simulated period for DDRS (Sc.2) is lower compared to DRS (Sc.2) & DRS (Sc.3). Additionally, DDRS shows potential for cost reductions, as the overall cost will reduce if more is collected through the blue bag or efficiency is achieved in the management of public bins. **Model output: Total net OpEx over the simulated period (= total operational cost - total revenue from recycling)** 	Scenario		DDRS	DRS
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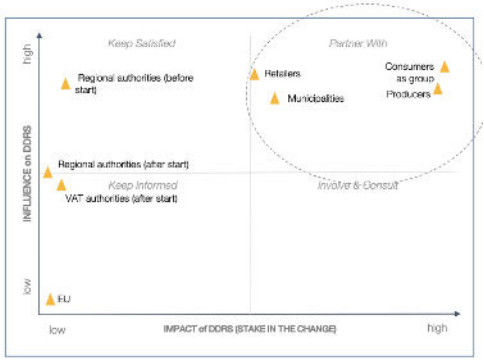
Sc.2	**Public bin restraint:** Collection points equal to est. number of public bins	297,235,974.94 €	
Sc.3	**Request from blueprint feedback:** Max number of collection points is 10,000		572,037,306.79 €	For the operational costs, it was more difficult to recalculate the costs provided by PWC given little detailing of the calculation. However, given the remarks made above, it seems that the conclusion in favor of a D-DRS vs DRS are not as conclusive as estimated initially. Notably given (non-exhaustive): - Underestimation of the pre & post sorting costs (D-DRS) - Overestimation of the recycling revenues (D-DRS) - Potential overestimation of the operational and maintenance costs for DRS
75-75	Financial results D-DRS and DRS	***Following the comments in the previous slides, the cost-benefit analysis is based on assumptions which might have flawed the results greatly.***

<table>
<tr><td>78
-8
8</td><td>Sensitivity analysis</td><td>Given the doubts on the validity of the cost-benefit analysis, comment on the sensitivity analysis would make little sense at this point.</td></tr>
<tr><td>89</td><td>D Impact DRS on cost of other household packaging in Blue Bag
Under a DRS, a significant volume will disappear from the blue bag
<table><tr><th></th><th>Declared beverage packaging</th><th>% of category</th><th>% of total declared</th></tr><tr><td>PET - Colorless</td><td>39,019</td><td>85%</td><td>12.94%</td></tr><tr><td>PET - Blue</td><td>8,995</td><td>94%</td><td>2.98%</td></tr><tr><td>PET - Green</td><td>3,266</td><td>93%</td><td>1.08%</td></tr><tr><td>Alu</td><td>22,025</td><td>72%</td><td>7.30%</td></tr><tr><td>Steel</td><td>7,964</td><td>21%</td><td>2.64%</td></tr><tr><td></td><td></td><td></td><td>26.95%</td></tr></table>If we redistribute the current total cost based on the remaining volumes after implementation of DRS, there could a an increase of cost for the other fractions of +37% in addition to the contribution today.
Over time, the cost for the other fractions could reduce again, depending on the consumer's behaviour and the organisation of collection.</td><td>True, shift would have an impact on the unit cost of collection of the other. However:
- Quid increased revenue given a higher quality of the recyclat (food-grade material when collected through RTR-DRS)
- If it results in increased cleanliness (thus saving costs of clean-up), isn't it worth the increased cost?</td></tr>
<tr><td>90</td><td>Items to be further developed
<table><tr><th>Items</th><th></th></tr><tr><td>Financing strategy</td><td>• Analysis of the need for an "industry fee" (e.g. to cover the difference between costs & revenue)
• Analysis of the need for an "handling fee" for local authorities (bin management)
• Impact on/ of Green Dot contribution (blue bag) and other (e.g. SUP), including alignment
• Cash flow impact management in function of deposit payments
• Integrated financing strategy for all different obligations</td></tr><tr><td>Deposit value</td><td>• Decision on the amount paid by the consumer (deposit)
▫ Variable deposit over time or stable
▫ Differentiated deposit for different beverage packaging based on size or other characteristics
• Incentive for consumers to return beverage packaging not in the DDRS scope (e.g. scrap value, cross-border shopping)</td></tr><tr><td>Deposit transactions</td><td>• Engagement with transaction service providers or banks to establish agreement
• Estimation of cost related to transaction unders DDRS (grouped or individual transactions)</td></tr></table></td><td>• Idea of a 'handling fee' for local authorities = interesting but clearly means that there is no longer any responsibility on retailers.</td></tr>
<tr><td colspan="3">IV) Governance Layer (91-100)</td></tr>
</table>

	This layer is not present in the study, although there should be 9 pages dedicated to this based on the Table of content.	???
V) Stakeholder layer (93-95)		

93-94	A Impact matrix of DDRS V. Stakeholder layer A. Impact matrix of the DDRS **Comment:** The overview does not contain all subgroups within stakeholder groups (e.g. consumers/ retailers). They have been identified in the various sub-chapters of the blueprint study, wherever relevant. **Stakeholder Group** | **Impact of DDRS** | **Influence on DDRS** | **Comments** Beverage producers and retailers (private label) or importers | High | High | Additional step during production/ packaging of the product because of printing/ stickering of the unique code on the packaging; reporting to DDRS system of PoM. Adaptation cost varies from low to high (depending on various parameters which are different from company to company) in relation to a.o. set-up and technology status) Retailers as PoS | Medium | High | Required for the activation of the deposit code; Adaptation effort is minimal to medium for all PoS. Consumers as group | High | High | Prefinances the deposit/ Structural change in behaviour required; effort depends on the collection mean (current blue bag system v. on the go disposal). Access, easiness and comfort are key requirements Regional authorities | Low | High | Required to develop legislative framework to ensure level playing field and various stakeholder commitments for the DDRS Municipalities/ IC | Medium | High | Important role for an efficient roll-out of the DDRS (e.g. permits and/ or localisation/ placement of public blue bins, distribution of home scanners to digitally impaired); depending on the finale operational set up a role in the operations (bin handling/ management) Central VAT authorities | Low | Medium | Agreement needed for DDRS to be treated as as classic deposit (outside scope of VAT) EU/ Regulatory Bodies | Low | Low | Indirect impact through upcoming/current legislative frameworks **Stakeholder Group** | **Impact of DDRS** | **Influence on DDRS** Beverage producers and retailers (private label) or importers | High | High Retailers as PoS | Medium | High Consumers as group | High | High Regional authorities | Low | High Municipalities/ IC | Medium | High Central VAT authorities | Low | Medium EU/ Regulatory Bodies | Low | Low  	• Impact of DDRS on Municipalities/IC is considered 'medium': *can we consider the reliance on municipalities for public bins management, home-scanners etc. as medium?*
95	B Items to be further developed Generic: Structural development of an integrated outreach strategy is required to create consistent, effective and efficient implementation of DDRS **Stakeholders** | **Sample of topics to further developed/ co-created** Beverage producers and retailers (private label) or importers | • Detailed impact assessment for small-medium sized beverage producers is needed • Industry-wide agreement on data structure, printing standards, label information Retailers/ Commercial PoS | • Detailed impact assessment for small-medium sized retailers/ commercial PoS is needed • Will need to be involved in discussions on unique codes Consumers as group | • Structural engagement is needed with the consumers, as they will be the end-user of the DDRS • Impact assessment of decisions on ease of use, access and comfort for the consumer Regional authorities | • Engage with regional authorities to obtain insight in their expectations of the DDRS & obtain their buy-in for implementation Municipalities/ IC | • Agreement is needed for placement of public blue bins and subsequent operational management Central VAT authorities | • Need for an agreement with the central VAT authorities on VAT treatment EU/ Regulatory bodies | • Analysis on potential infringement on "free movement of goods" as a result of mandatory unique codes for the Belgian market. • Analysis of opportunities to receive EU funding (subsidies) to develop the DDRS	

VI) Legal Layer (98-109)

98

A GDPR considerations for DDRS - Applicability

Is the GDPR legislation applicable for the implementation and use of a DDRS ?

GDPR comes into place when processing happens – "Processing means any operation or set of operations performed upon personal data or sets of personal data (...)" [1].

Data Processing for DDRS

- Data will be collected via/ in collaboration with public and administrative entities for the digitally impaired users (i.e. home scanner)
- Data will be used in order to allow DDRS NPO to perform contractual obligations towards customers, but also towards producers
- DDRS NPO will process data linked to customer habits, as well as other data such as bank account details, geo-localisation, etc.

- Should DDRS not be GDPR compliant or should the data be inaccurate/... DDRS NPO risks to face:
  - Administrative or criminal fines imposed by a Supervisory Authority
  - Order to cease the processing activities underlying the system (and to terminate the DDRS as such)
  - Contractual liability towards and claims from consumers, other partners
- If the conditions outlined in this section are fulfilled, DDRS can be fully GDPR compliant.

A GDPR considerations for DDRS - Type of processing activities that will apply to DDRS

Non-limitative and illustrative list of processing activities falling under the scope of the DDRS NPO:

- Creation, maintenance and deletion of a customer account (online or via app)*
- Creation, maintenance and deletion of a customer account (via municipalities)
- Registration of the user activity (scan of tags) on the account*
- Payment services*

Additional processing activities that might take place in relation to DDRS:

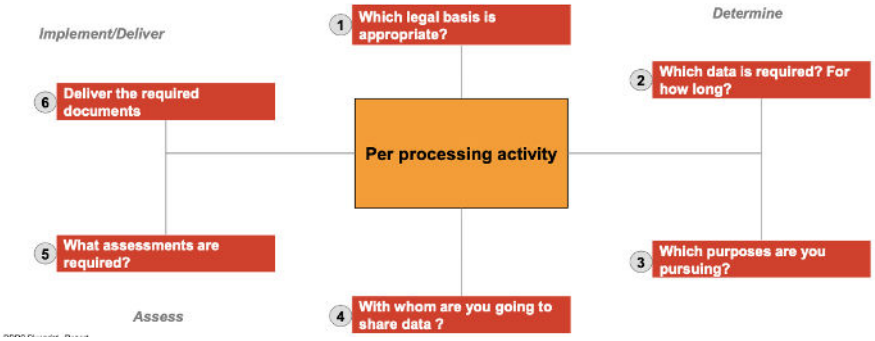
- Monitoring of performance of DDRS
- Fraud detection
- Claims and litigation
- Reuse of data for commercial purposes
- ....

Based on the current DDRS blueprint, we have determined that the above listed processing activities may occur throughout the DDRS operations. This non-exhaustive list might however be expanded during the course of our further analysis / the development of the project.
For example : the creation of a CRM, the storage of data for accountability purposes,...

100-105

A GDPR considerations for DDRS - GDPR Compliance Framework

Determination and assessment consists of...



For each processing activity DDRS NPO should…

1. Determine the correct legal basis to collect personal data

Without legal basis, your processing activity is not lawful, meaning that DDRS NPO could face fines or an injunction to cease the activity.

Option 1: Consent — For non-necessary optional features

Processing activities are allowed insofar the data subject has freely, specifically and unambiguously consented to them.

Question at stake: Is consent freely given in the framework of DDRS?

Risk: What to do when Data Subject retracts consent?

Option 2: Performance of a contract — For the core features

Processing activities are allowed insofar they are strictly necessary for the performance of a contract concluded between the data controller (DDRS) and the Data Subject

Question at stake: There must be a contractual relationship between DDRS NPO and the data subject?

Option 3: Legitimate interest — For additional features

Processing activities are allowed insofar the DDRS NPO has a legitimate interest to process such data (not overruled by a contradictory legitimate interest of Data Subject)

Deliverable: Perform a legitimate interest assessment

For each processing activity DDRS NPO should…

2. Determine the data transfers

When sharing/acquiring/making data available to third parties → DDRS has a specific responsibility of making sure this happens in a GDPR compliant manner

1. Determine the data flows with external parties

Question: In which situations will data be accessed from/ via third parties?
E.g., App developers, app providers, service providers supplying specific software applications

→ Manufacturer of cans, packaging company, organism which will be in charge of verification of the app/ refund to end user, specific financial payment service, …

2. Determine the GDPR role of those parties

- Data controller: determines purpose + way of processing
- Data processor: processes on behalf of data controller
- Joint data controller
- Separate data controller

→ Once the GDPR roles have been settled, appropriate data processing / sharing agreements should be established (implementation phase)

3. Determine when data is shared, stored or transmitted outside EEA

For each processing activity DDRS NPO should…

3. Undertake compulsory assessments under GDPR

When sharing/acquiring/making data available to third parties → DDRS has a specific responsibility of making sure this happens in a GDPR compliant manner

1. Data protection impact assessment (DPIA)

- Required in case of "high risk processing operations"
  - E.g. DDRS NPO ("innovative technology")
- To be conducted before the processing of data
- To be considered as a living tool, not merely as a one-off exercise
- DPO should be involved

2. Legitimate interest assessment (LIA)

- Required in case "legitimate interest" is being invoked as lawful base to process data
  - E.g. longer retention of data for fraud prevention
- Used to identify what the exact legitimate interest is at stake + identity whether the processing is necessary for that legitimate interest

3. Transfer Impact Assessment (TIA)

- Concerns international transfer of personal data
  - E.g. cooperation with a cloud provider located outside the EU
- Used to clarify data privacy risks in case of transferring EU residents' data to countries without adequacy under the GDPR.
- Elaboration of a questionnaire to be completed by data importer or data exporter.

For each processing activity DDRS NPO should…

4. Collect data in a legal way (incl. Purpose and storage limitation)

1. **Was the data subject properly informed ?**
2. **Has the collected data been minimalized in proportion to what is needed for the outpointed purpose? How will the data be collected ?**

→ verify whether data has been collected for specified, explicit, and legitimate purposes

- E.g.: bank details can only be collected for effectuating the deposit reimbursement
- E.g.: a standard user account registration form often includes the question to provide birthplace and/or personal address → not necessary for purpose of processing

3. **Determine retention policies**

→ Determine what data will be archived (and for how long) and what will be deleted

→ personal data may not be kept longer than is necessary for the purposes of the processing

Main Deliverables

- **DDRS NPO is required to properly document and demonstrate the compliance of DDRS NPO with the GDPR key principles and requirements**
  - DPIA
  - RoPA (Record of Processing Activities)
  - Retention policy
  - Data breach notification scheme
- **DDRS NPO needs to inform the data subjects and handle their requests**
  - Privacy policy
  - DSR procedure (Data Subject Request)
- **In margin of the GDPR requirements, DDRS NPO needs to clearly delineate the rights and responsibilities of the users of the apps**

106-108

B High-level input VAT aspects - Legislative framework

STARTING POINT = European VAT Directive

TRANSPOSED into Belgian legislation

DEROGATES from EU Directive

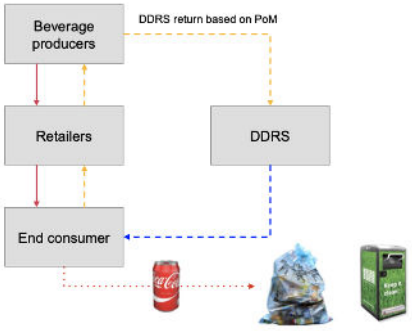
DEPOSIT = outside scope VAT

Conditions deposit

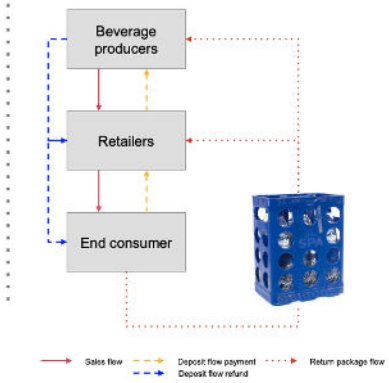
(A) It must be ordinary and customary packaging materials;

(B) It must be agreed that these packaging materials must or may be returned and the customer is entitled to a refund if he/she returns them.

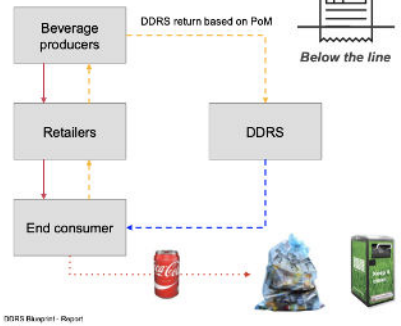
Simplified visualization of the proposed model



Traditional deposit model



Preferential VAT treatment



DDRS as classic deposit outside scope of VAT

NEED for an agreement with the central VAT authorities

Parallel can be made to traditional system, where DDRS has taken the role of the producers

- Producers pay service fee to DDRS
- No VAT impact in B2B relation
- No distortion of competition (low value) (especially if mandatory)

Customer is guaranteed repayment upon return of the packaging materials

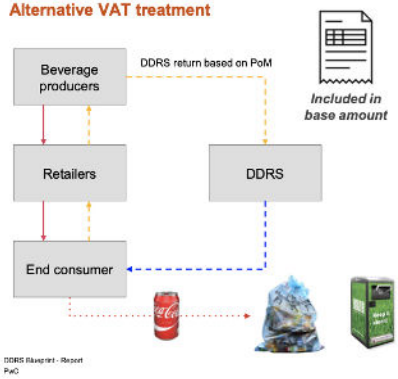
- Producers pay deposit to DDRS based on PoM declaration
- DDRS pays deposit to customer upon 'return'

Technical system set-up should prevent fraud

- Producers communicate the codes of products put on market
- Codes can only be activated at PoS upon sale at which time cross check is done against the codes communicated by producers
- Deposit can only be claimed back once per code
- 'Proof' of return will be captured in the system

Recommendation to add value of deposit on ALU/PET to support the VAT treatment as a 'deposit'

Alternative VAT treatment

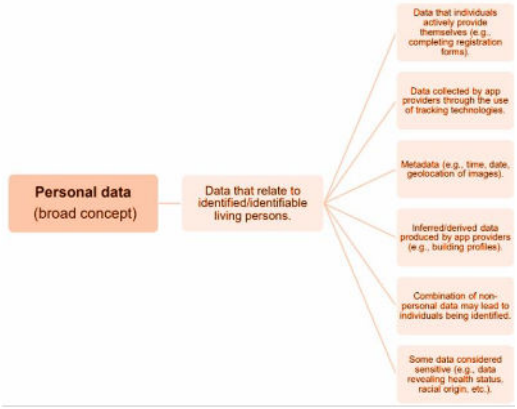
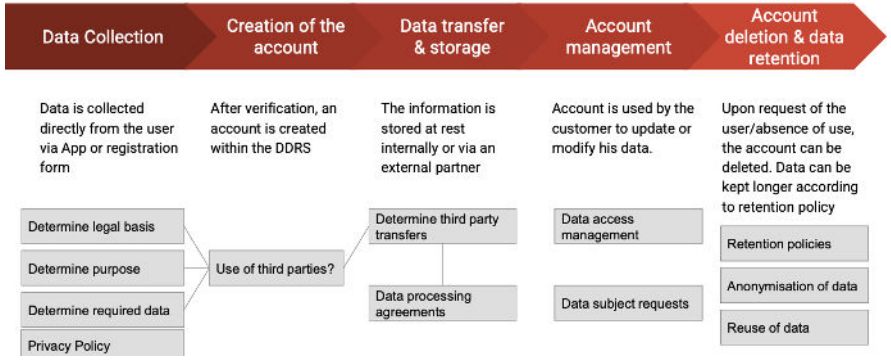


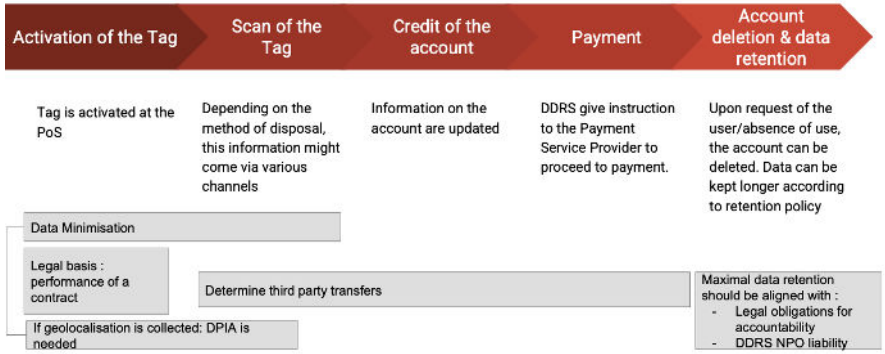
DDRS as lost packaging cost

In case no positive agreement is reached with the TA

- DDRS is viewed upon as usual cost of packaging to be included in the base amount subject to Belgian VAT
- Additional cost end consumers: VAT on deposit

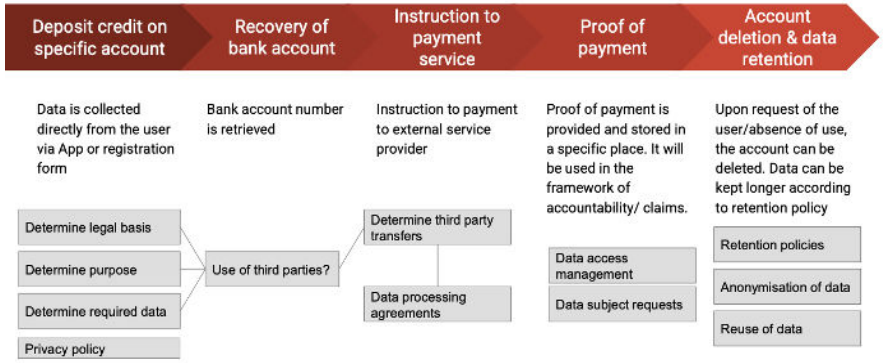
Annexes

Legal		
118	Legal - General: DDRS NPO entails processing of Personal Data ***Personally identifiable information (PII)**, which is any data that can be used to identify a specific individual such as:* • *Basic identity information – name, address and ID numbers, email addresses, banking details* • *Web data – location, IP address, cookie data, tags, login IDs, social media posts, or digital images* • *Geolocation* • … 	
119	Legal - Account creation, management & deletion 	
120	Legal - Deposit & Payment service	



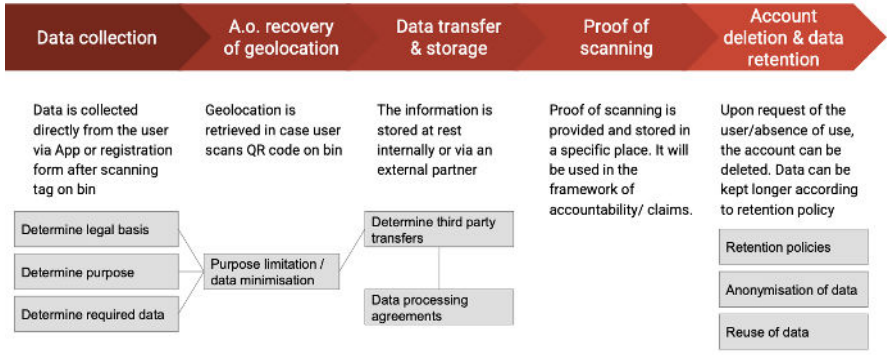
12 1

Legal - Payment of the deposit



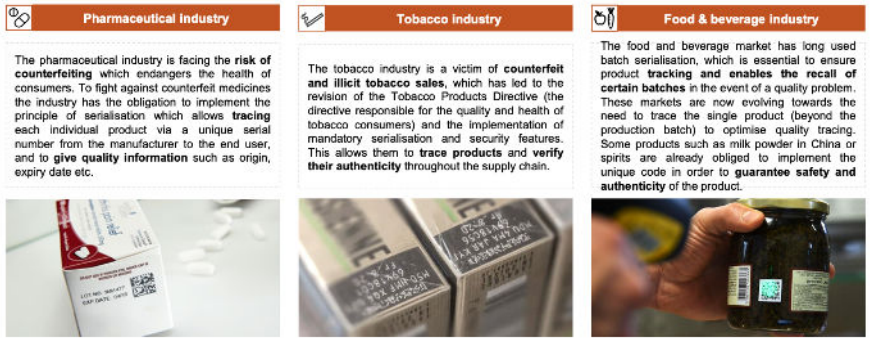
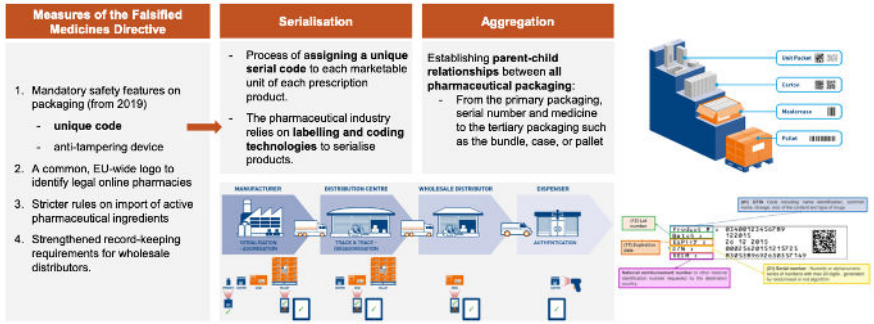
12 2

Claim of tag on a user account



124	**Article 92 EU VAT Directive 2006/112/EC** As regards the costs of returnable packaging material, Member States may take one of the following measures: (a) exclude them from the taxable amount and take the measures necessary to ensure that this amount is adjusted if the packing material is not returned; (b) include them in the taxable amount and take the measures necessary to ensure that this amount is adjusted if the packing material is in fact returned. **Transposed into article 28, 4° of the Belgian VAT code** The taxable base amount does not include [...] 4° the costs of usual packaging materials if the supplier agrees to their reimbursement in the event of return of those packaging materials.	
125	**Decision E.T. 12114 (nr 483) dd. 30.04.1974 (excerpt)** In order for the costs of packaging materials not to be included in the taxable amount, the following conditions are required: 1° it must be ordinary and customary packaging materials; 2° it must be agreed that these packaging materials must or may be returned and the customer is entitled to a refund if he returns them. Conditions are assumed to be met if the statement "deposit" or a similar statement is mentioned on the invoice, insofar as this is in accordance with the parties' understanding. **Parliamentary question nr. 326 De Clippele dd. 02.10.1991 (excerpt)** The Honorable Member will find below the list of the different groups of simplification measures in force in Belgium under Article 27 of the Sixth VAT Directive of 17 May 1977 (77/388/EEC) Z. Revue nr. 30, p. 266. [...] - Regulations in which the taxable amount is not revised: [...] b) Taxable amount does not need to be revised if the ordinary and customary packaging materials, of which the costs were not originally included, are not returned by the customer	
126 - 127	**Article 27 of the Sixth Directive transposed into article 394 of EU Directive 2006/112/EC** Member States which, at 1 January 1977, applied special measures to simplify the procedure for collecting VAT or to prevent certain forms of tax evasion or avoidance may retain them provided that they have notified the Commission accordingly before 1 January 1978 and that such simplification measures comply with the criterion laid down in the second subparagraph of Article 395(1). **Explanatory Memorandum (extraordinary session - 1968 - 15 October 1968) (excerpt)** Article 28, 1° to 4°, does not introduce any novelty. Also in the current system of the transfer tax [edit: currently known as value added tax] are excluded from the taxable amount: [...] 4° the sums of which the contract permits deduction for any return of packaging used for transport, whether or not such return takes place. **Explanatory Memorandum (extraordinary session - 1968 - 15 October 1968) (excerpt) (continued)** With regard to packaging materials, it should be noted that their taxation between taxable persons is without any interest in a VAT system. Indeed, if the costs of packaging materials were included in the taxable amount of the tax due on the delivery of the packaged goods, the return of those packaging materials would have to be refunded for the tax calculated on the price or its value value, which can only entail complications in the area of accounting and administration. It is true that the ordinary and customary packaging materials referred to in 4° will not be taxed with regard to the supply of goods to a non-taxable person, in particular a private individual. But that objection is not such as to create distortions in competition. It should also be noted that the envisaged regulation does not apply to packaging materials other than ordinary and customary. Those packaging materials must be regarded as separate goods for the purposes of the tax, regardless of how they are invoiced.	

Case study

129	Understanding the background of the serialisation techniques of other industries and integrating it into existing processes 	
130	(1) The pharma industry - unique serial numbers to prevent counterfeit medicines In order to improve the safety of medicines, the EU has put in place a Directive on Falsified Medicines which introduces several measures to fight medicine falsifications and ensure monitoring. 	
131-132	Case: Alliance Healthcare artesan **What?** Modern serialisation solution for Artesan with unique data matrix code and individual serial number provided by METTLER TOLEDO PCE **Why?** Securpharm requirement: initiative protecting German pharmaceutical distribution system from counterfeit medicines **How?** Datamatrix code and individual serial number are stored in central database so each pack can be easily identified at any point in time. The Datamatrix Station XMV by Mettler Toledo PCE is used to mark and verify boxes. **Impact** N/A **About** Artisan is a German **contract manufacturer** in the **pharma industry** supplying various international markets. The company offers services from product development and project management to **serialisation services**, packaging and distribution. **Case** The **Track & Trace solution** marks packaging for purely prescription medicines, in line with the securPharm requirement, with a data matrix code and a serial number in plain text. **Integrated camera** checks whether data content is correct and legible immediately after the printing process. The acquired data is stored in a **database** during the labelling and verification process **Production** - Located on the production line **between the cartoner and checkweigher** - Throughput of up to **350 packs per minute** - Can be **easily integrated** into every production line because of adjustable height and belt speed - Can be deployed in a flexible manner to several production lines	

Alliance Healthcare

What?	*Zetes* solution for serialisation and packaging identification
Why?	Falsified Medicines Directive compliance requirement (came into force on February 2019)
How?	The combination of a logistics execution solution and an advanced supply chain traceability software enables the company to streamline event handling, reporting and communication with national hubs.
Impact	Full visibility of the product pathway, eliminating the risk of non-compliance

About

Alliance Healthcare is the **wholesale and healthcare services** business of Walgreens Boots Alliance, supplying medicines, other healthcare products and related services to pharmacies, doctors, health centers and hospitals.

Case

The *Zetes* FMD solution was **implemented across 100+ sites** throughout Europe. The solution was **integrated with existing internal warehouse management systems** to enable the verification and/or decommissioning of products. It also allows Alliance Healthcare to communicate with third-party systems enhancing **supply chain collaboration and communication.**

Production

- Operators **scan** medicines with handheld or desktop terminals
- Data is then captured and **verified** real-time
- Captured data is automatically checked against the **National Medicines Verification System (NMVS*)** and **stored**

*NMVS serves as a **verification platform** that pharmacies, wholesalers, doctors etc. can use to check the **authenticity** of a product

13 3

(2) The tobacco industry: unique identifier codes to combat illegal production and trade

Europe has put in place a Tobacco Products Directive which sets the framework for the tracking and tracing of the movements of tobacco products on the EU market.

Tobacco Products Directive

- **EU-wide track and trace system** for the legal supply chain of tobacco products & system of security features to help **detect illicit products**
- Each tobacco product should be marked with a **unique code** and the introduction of **security features** to prove authenticity.
- The unique code will be registered in a **European database** in order to track each product throughout its life cycle.
- **Manufacturers** should conclude **data storage** contracts with independent third parties and copy all information into an EU-wide database

Set up of traceability system

ID issuer

Member states appoint ID issuer that **generates and issues unique identifier codes** to be applied to unit packets

Independent from tobacco industry

Code generation

ID issuer generates **unique code** for unit packets or aggregated packaging

Data storage

Manufacturers and importers contract with a **data storage provider** to **host the traceability data** related to their products

Traceability

Commission select a provider of a **"secondary" repository** that will store a copy of **all traceability data** which will provide authorities with an overview of all product movements

Movement is scanned and recorded throughout the supply chain

13 4-13 5

Case (1/2): CTS Santelé
Serialisation and traceability for tobacco products

CTS

What?	*Zetes* solution for serialisation and packaging identification
Why?	Tobacco Products Directive compliance requirement
How?	Implementation of unit coding (& retrofit the existing production lines with serialisation capabilities) to achieve full traceability and to track all logistical events in the life of a product, from production to delivery
Impact	Overview of all the logistics activities and transport throughout the entire supply chain

About

CTS is an **SME tobacco producer**, specialising in the cutting and manufacturing of fine cut tobacco. They are now established internationally with teams based in Belgium, France and Spain.

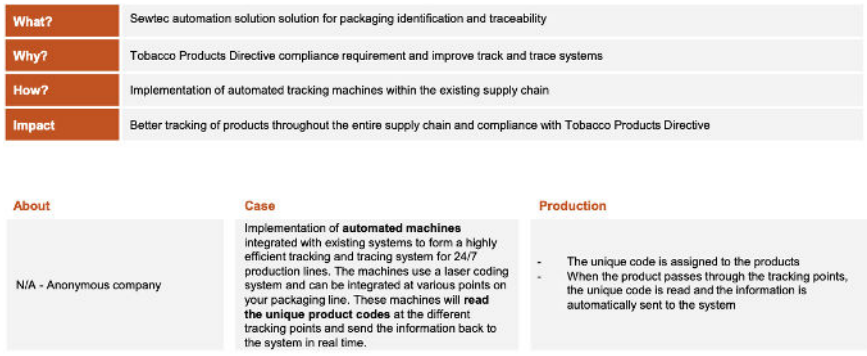
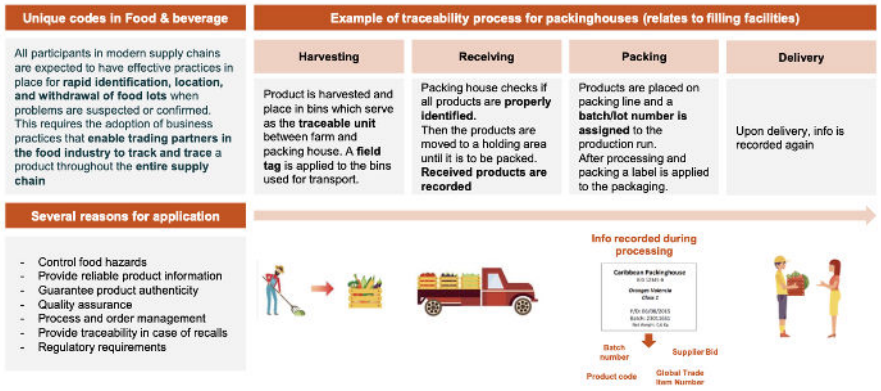
Case

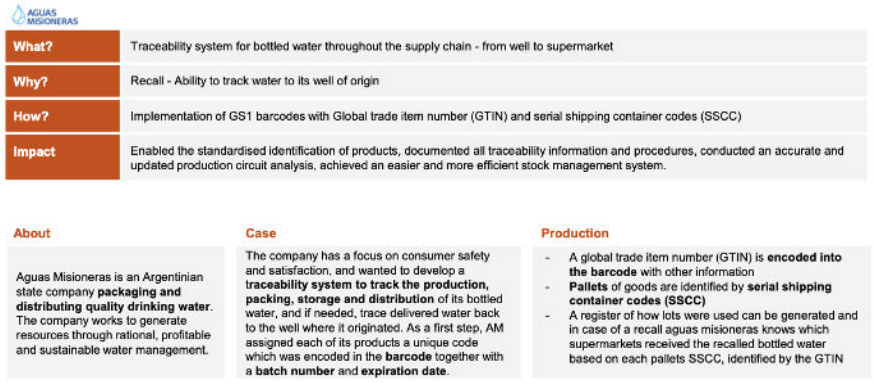
Zetes implemented serialisation capabilities on the production lines of CTS Tobacco. CTS **serialises and aggregates** all packaging with a unique code, which purchases from Incert*. Then, *Zetes* takes care of the packaging and product identification that the TPD requires.

*The government organization that provides the unique Belgian identifiers.

Production

- At the end of production, the **unique code is assigned** to the package along with the necessary data (TPD identification)
- The code is then **verified** by a machine (Anti Tampering Device Reading Verification) before the packages are boxed and tracked (scanned).
- Each time the box/package is scanned along the chain (on average ten times), the **data is sent** in real time

	Case: Anonymous company Traceability for tobacco products with Sewtec automation solution 	
136	(3) Unique codes are applied regularly in the food and beverage industry, for a variety of reasons 	
	Case (1/2): Aguas Misioneras	

	Providing consumers with bottled and traceable Argentinian water  AGUAS MISIONERAS **What?** Traceability system for bottled water throughout the supply chain - from well to supermarket **Why?** Recall - Ability to track water to its well of origin **How?** Implementation of GS1 barcodes with Global trade item number (GTIN) and serial shipping container codes (SSCC) **Impact** Enabled the standardised identification of products, documented all traceability information and procedures, conducted an accurate and updated production circuit analysis, achieved an easier and more efficient stock management system. **About** Aguas Misioneras is an Argentinian state company **packaging and distributing quality drinking water**. The company works to generate resources through rational, profitable and sustainable water management. **Case** The company has a focus on consumer safety and satisfaction, and wanted to develop a **traceability system to track the production, packing, storage and distribution** of its bottled water, and if needed, trace delivered water back to the well where it originated. As a first step, AM assigned each of its products a unique code which was encoded in the **barcode** together with a **batch number** and **expiration date**. **Production** - A global trade item number (GTIN) is **encoded into the barcode** with other information - **Pallets** of goods are identified by **serial shipping container codes (SSCC)** - A register of how lots were used can be generated and in case of a recall aguas misioneras knows which supermarkets received the recalled bottled water based on each pallets SSCC, identified by the GTIN Case (2/2): Alfajores El Molle Enabling digitalisation and traceability with serialisation **What?** Unique code and traceability system (via serialisation with GS1 standards) for sweet treats throughout the supply chain **Why?** To comply with food safety regulations, attain certifications and better manage its broad stock of alfajores **How?** Implementation of GS1 barcodes with Global trade item number (GTIN) and serial shipping container codes (SSCC) & a traceability system via the GS1 TrazAR platform to capture data and track products **Impact** Enables data digitalisation and process automation, Provides for improved management in terms of suppliers and available stock, Centralises data, Promotes work culture with a focus on food safety **About** Alfajores El Molle is a small, family-owned business located in Argentina. The company **produces handmade** alfajores, a popular **confection** in Argentina, in a variety of flavours. **Case** Alfajores El Molle wanted to better manage its stock by uniquely identifying the flavours of alfajores in its extensive product line. Furthermore, the company needed to create a traceability system to comply with regulations and achieve specific certifications. They implemented **GS1 barcodes** encoded with GS1 **identifiers** and a **traceability system** (GS1 TrazAR platform) to collect digitised data and track product. **Production** - To lay the foundation of the traceability system, Alfajores El Molle implemented GS1 identifiers (GTIN & SSCC) encoded in **GS1 barcodes to uniquely and accurately identify product flavours and dispatched units** - They implemented the GS1 TrazAR platform to digitalise the collection of data associated with their procedures, and it helps them to **solve problem of stock handling**	
139	Main challenges to overcome when introducing serialisation **Data Management & efficient technology** – Serial numbers, master data and event information need to be **exchanged among supply chain parties** and also **reported** in a compliant way. Data must also be **protected** from hackers and other cyber criminals. – **Inefficient technology** can lead to coding errors, unplanned downtime, high consumables cost, complex multi-supplier integration, and issues with laser operator **Productivity** If there is a risk of **OEE* reduction** when introducing serialisation: – the introduction of a completely new packaging line is considered preferable; – as well as the use of a centrally configurable process management software **Imported products & international requirements** During export, companies have to adapt to the **different regulations** of the countries in terms of necessary information and serialisation. – For example, for **medicines**, there is a European serialisation system that lays the foundations for serialisation and mandatory information. **Capabilities & outsourcing** The choice to outsource filling will also depend on the company's ability to offer compliant serialisation. – Many companies choose to **outsource packing** to companies that already have the **capabilities and expertise to do serialisation** for them in order to reduce costs. * Overall Equipment Efficiency	
140	Datasystems used to manage unique identifiers Benchmark of suppliers	

Supplier	About	Country	Size	Integration	Software	Functionalities		
						Unique code	Printing	Traceability system
Adents	Supply chain solutions, serialisation and tracking	FR/US	Big - international	Integration with ERP and MES systems	**Adents supervisor** to configure all your packaging lines and serialisation parameters + drives serialisation and aggregation	X		
					Adents pilot manages the marking and control of unit-level codes on the production line and ensures accurate transmission of information		X	
					Adents Prodigi Serialisation and traceability solution to generate, manage, exchange, enhance and analyze serialisation data			X
GS1	Solutions for identification, EPC/RFID barcodes & labels, and supply chain standards system	BE	Big - international	Integration with ERP and MES systems	**GS1 standards** provides the global framework and local implementation services to ensure that traceability systems are interoperable and scalable	X		
Zetes	Supply chain solutions and technology	BE	Big - international in EMEA	Integration with existing WMS or ERP systems	**ZetesZeus** is a product traceability software and track & trace platform			X
					ZetesAtlas is a packaging execution system that provides quick and easy identification, serialisation, aggregation and traceability	X	X	

14 1

Suppliers of digital deposit return system
Benchmark of suppliers

Supplier	About	Solution	Functionalities	Country	Size
Polytag	Mobile application for the DDRS	Polytag DDRS	• Provides a **phone application** that allows digital deposit return system (scan the container and receive the deposit on their app wallet). • Solution uses serialisation to capture in-scope drinks containers	UK	small
Reward4-waste	Mobile application for the DDRS	Reward4waste	Can generate unique codes or work with other code providers. • Provides a phone application that allows digital deposit return system (scan the container and receive the deposit on their app wallet). • Solution uses serialisation to capture in-scope drinks containers	UK	small
Recyclever	Reverse vending machine for DDRS	Recyclever	• They **manufacture Reverse Vending Machines** used with DDRS for PET bottles, cans, and glass bottles. • Consumers use Reverse Vending Machines (RVM) to return empty drinks containers and obtain a reward. RVM's are installed in supermarkets and premises like council collection points, workplaces and many others.	UK	small

14 2

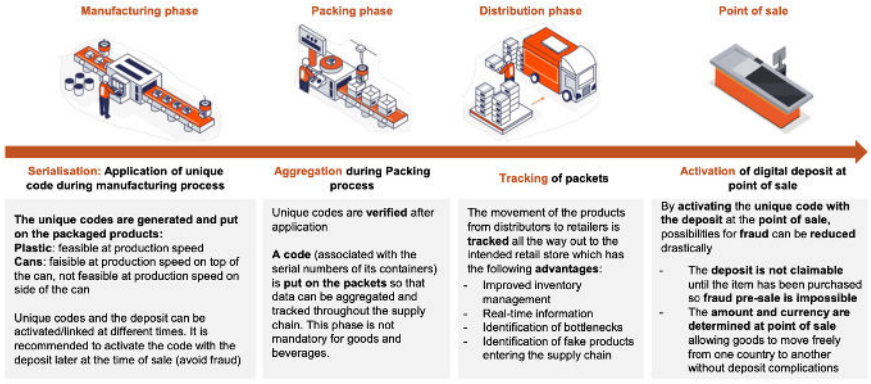
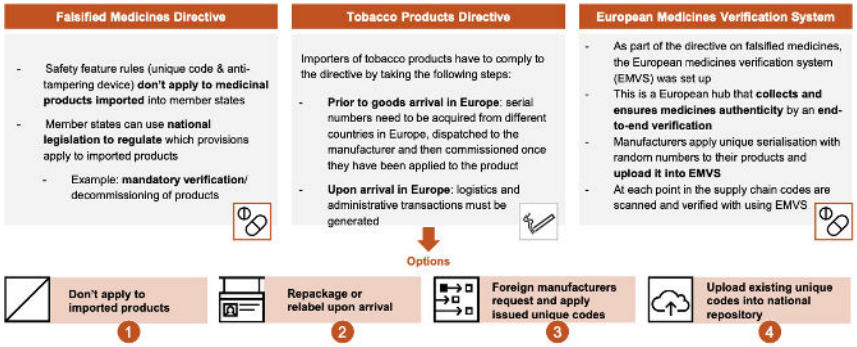
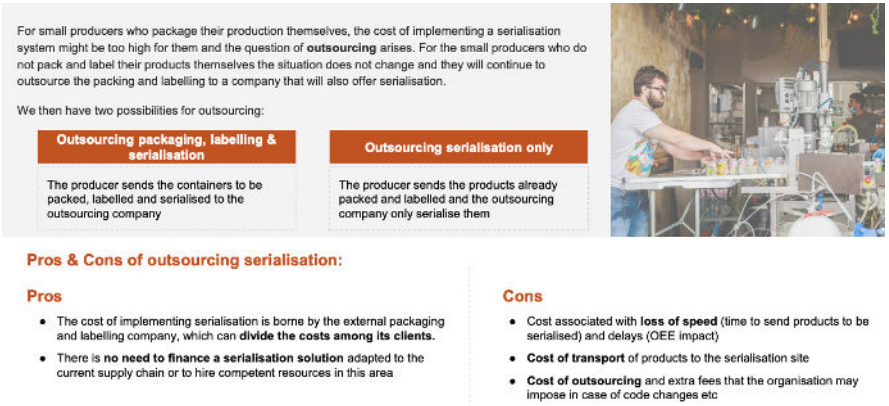
Which technologies are on the market ?

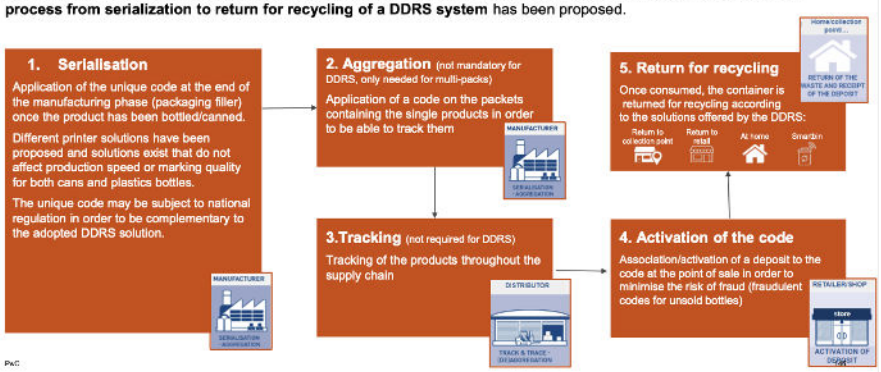
The optimal printing and marking technology for a given application depends on factors including the packaging substrate, equipment integration, production speeds and code requirements.

	Operation	Specificities	Type of surface
Inkjet	An inkjet printer prints by spraying tiny drops of ink on the surface.	High coding accuracy even on concave surface of a can Production speeds **540** cans/min Non permanent print Most frequently chosen coding solutions	Type of surface: **metal, plastics,** and flexible packaging Concave surface like **cans: YES**
Thermal Inkjet	Uses a drop ejection process that fires very small droplets of ink, resulting in a high printing resolution. The system works by applying a voltage and heating the ink rapidly and ejecting the ink from the nozzle because of expansion.	Production speeds max **300**cans/min Low-cost Non permanent print	Type of surface: **metal, plastics,** and flexible packaging Concave surface like **cans: NO**
CO2 laser	CO2 machines usually produce the laser beam in a sealed glass tube which is filled with gas, usually carbon dioxide. A high voltage flows through the tube and reacts with the gas particles, increasing their energy, in turn producing light.	High coding accuracy (not on concave surface) Is more compact Production speeds **1,200** cans/min Permanent print Almost no downtime	Type of surface: **metal, plastics,** and flexible packaging Concave surface like **cans: NO**
Fiber laser	Fiber lasers use pump light from what is called laser diodes. These diodes emit light that is sent into the fiber-optic cable. Optical components located in the cable are then used to generate a specific wavelength and amplify it. Finally, the resulting laser beam is shaped and released.	High coding accuracy even on concave surface of a can Is more compact Ability to more effectively penetrate and code reflective Materials, such as aluminium cans Production speeds **1,500** cans/min Permanent print Almost no downtime **The most innovative solution that does not reduce the speed of can production**	Type of surface: **metal, plastics,** and flexible packaging Concave surface like **cans: YES**

14 3

What is the process fostered for serialisation, aggregation and

	DDRS?  	
144	How to manage products imported from abroad? Use cases from other industries applying serialisation  	
145	Small producers: outsourcing  	• Outsourcing the serialisation doesn't seem to be a solution which matches the reality of the constraints faced by small producers. To what extent would this be a feasibly solution to allow them to limit the costs of the system (especially so that they remain in line with relative cost that larger producers pay). • *Has any small producer been consulted on the idea of a D-DRS? What was their reaction*?

146	## Process overview as conclusion The implementation of a DDRS implies the serialisation of all PET bottles and cans sold in the Belgian market, a serialisation already implemented for example by the tobacco and pharmaceutical sectors. Based on the explained research a **final process from serialization to return for recycling of a DDRS system** has been proposed. 	
148	## Introduction **Deposit Return Scheme** In a *Deposit Return Scheme (DRS)* a small value is assigned to an **item of packaging** which is refunded to a customer when the item is returned via a **dedicated collection points**. This 'deposit' acts as an incentive for consumers to return the empty container, subsequently supporting reuse or recycling. The means to return the items: Return to collection point Return to retail **Digital Deposit Return Scheme** A *digital deposit return scheme (DDRS)* builds on the classic deposit return system by **assigning a unique code to the product and a second code to collection points**, so that consumers can return the product (thus claiming their refund) at home or on the go using a smartphone app. The means to return the items: Return to collection point Return to retail At home Smartbin 	
149	## Return & recycling rates for DRS - EU	

***5 countries in Europe with a DRS in place** (selection based on n° of inhabitants or located near Belgium)*

Countries	Type of DRS	Start of DRS	Scope	Deposit	Return Rate*	Recycling Rate**
Germany	Return to retail	2003	Plastic (predominantly PET), metal (aluminum), glass	PET bottle 0,25€ Cans 0,25€	97% PET bottles 99% Cans	Plastics total 104% Cans 107%
The Netherlands	Return to retail	2005	Plastic (predominantly PET)	PET bottle 0,10€ to 0,25€	95% PET bottles Cans (to implement in 2023)	Close to 100%
Sweden	Return-to-retail & collection point	1984 cans 1994 PET	PET, HDPE, aluminium, steel	Cans 0.11€ PET bottle<0,5L 0.11€ PET bottle>0,5L 0.22€	84% PET bottles 85,8% Cans	Close to 100%
Norway	Return to retail	1999	Plastic (predominantly PET, HDPE), metal (aluminum/tinplate)	PET bottle, Cans<0,5L 0,16€ PET bottle, Cans>0,5L 0,25€	89% PET bottles 89% Cans	97%- 100%
Croatia	Return to retail	2006	Plastic (predominantly PET), metal (aluminum and tinplate), glass	PET bottle 0.06€ Cans 0.06€	89% PET bottles 79% Cans	Close to 100%

→ All the 10 countries in the European continent that have a DRS system in place have a **return rate above ~80%**.

*Return rate represents the amount of beverage containers collected (by weight or unit) expressed as a percentage of the amount of beverage container material placed on the market, excluding exports.
**Rates above 100% are more likely to be linked to the return of bottles and cans from other neighbouring countries to access the deposit.

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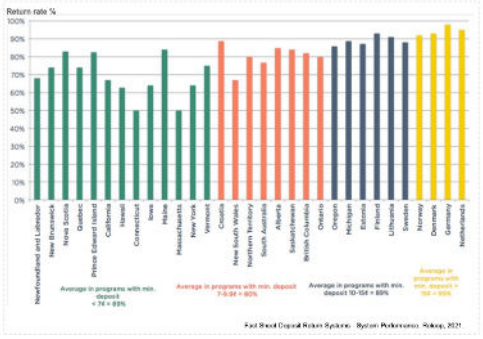
Return & recycle rate for DRS - Worldwide

Latest return rates in Deposit Return Systems by minimum deposit value (USD)



It can be concluded that **the higher the value of the deposit the higher the return rate** - All countries with a deposit value above **0,15 €** have a return rate above **90%**.

Scientific research has also been able to highlight other elements that impact on people's behaviour (e.g. sorting) and therefore on the return rate:

- **Dirtiness**: A dirty or dilapidated state of collection point
- **Distance**: Distance to travel to the collection point
- **Weekly collection**: Frequency of collection
- **Visibility of sorting (normative)**: Sorting is a normative behaviour and social visibility (e.g. door-to-door collection) leads to more sorting
- **Information**: Level of information about recycling to the population
- **Perceived constraints**: The perceived constraint (physical effort, time and space requirements) leads to less sorting
- **Belief in effectiveness**: The more people believe that recycling is efficient and environmentally friendly, the more they sort

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Move towards digitisation and kerbside collection for DRS

Norway

The **largest online grocery shop, Kolonial** (rebranded Oda), delivers groceries to individuals and businesses and then had the idea to offer to collect customer returns on deliveries for its customers. They **collect empty waste from customer houses**, the waste is collected in plastic bags, which are scanned by Kolonial at the time of collection. This saves the customer having to travel to a collection point. **The money is then credited to the customer's account**. Kolonial is associated with one of the deposit return organisations to bring the waste to be recycled to them. This service exists from 2016 and in 2020 Kolonial collected nearly 3.3 million bottles and cans.

→ https://infinitum.normedia/twcha5rg/infinitum_aarsrapport_2020_en_web_spreads.pdf
→ https://www.acrplus.org/images/technical-reports/2019_ACR_Deposit-refund_systems_in_Europe_Report.pdf

Czech Republic

Mattoni and online grocery shopping site Košík.cz have created the first circular, deposited bottle. It is made out of 80% recycled plastic, and will get a new lease of life when returned. They provide the same service as Kolonial.

→ https://www.mattoni1873.cz/en/our-responsibility/

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DDRS - pilot projects

- Conwy pilot: households received a welcome pack and therefore didn't pay a entry deposit
- Whitehead: no deposit so this was by no means a D-DRS pilot

There are currently no examples of a DDRS implemented on a national scale, but various pilot projects have been carried out. Here are 3 cases of DDRS pilot projects:

	Polytag - 2021 *Conwy (UK)*	Reward4waste - 2021 *Dublin (IRL)*	Reward4waste - 2020 *Whitehead (IRL)*
Duration	4 weeks	4 weeks	4 months*
Target population	325 households	200 households	2000 households
Sample size	83% (271 households)	72% registered (145 households)	25% of households
Product scope	A set of plastic water bottles	Milk bottles	Drinks containers (plastic bottles, milk bottles, glass bottles and cans) from a specific shop
Deposit	YES 0,2€	YES 0,2€	NO (only reward for voucher)
Unique product code	YES	YES	YES
Collection point code	YES (QR code sticker on their own bin + tagged bin collection point)	YES (code on their own bin)	YES (unique code on box at home/ bin collection)
Type of collection/ return by consumer	Kerbside collection. At home by scanning their bin & their bottle with an app. For households without smartphone, register on a 'vendor app' and placed the empty bottles in a uniquely tagged bin at a collection point.	Kerbside collection. At home by scanning their bin & their bottle with an app.	Kerbside bins or collection points.
Results**	97% engagement rate (263 registered households scanned at least one bottle)	94% of return rate (655 returned/ 700 delivered)	The trial objective did not include testing the deposit/return function but only the motivation of people for DDRS and the use of the app. Survey were conducted.

There is **no national implementation** of DDRS.

Therefore a precise comparison in the field can not be done with DRS.

The result of these pilot show promising results in terms of engagement, adoption by consumers and collection rates.

Several studies claim that there could be an **increase in the return rate with a DDRS solution** compared to DRS as the convenience of engaging with a DDRS at the kerbside could attract greater container return rate from consumers.

DRS	D-DRS
Pro	
● Positive impact on the litter (compared to no incentive) ● Positive impact on the return and recycling rate (compared to no incentive) ● Limited change for producers (requires one-time change in label) ● Suitable for reuse by reverse logistic from the supermarket ● Increase in recyclate quality (no contamination) ● No issue of data privacy / GDPR compliance ● No risk of people redeeming the deposit without properly discarding the packaging. ● Accessible to all: children, older generations, people without smartphone, tourists (no need for a smartphone, digital capacity or bank account) ● Align with practices of neighboring countries ● Presence of employee support at take-back locations	● **(Assumption).** Positive impact on the litter (compared to no incentive) ● **(Assumption).** Positive impact on the return and recycling rate (compared to no incentive) ● Flexibility in the means of collection (at home & on the go) ● Builds on existing success of blue bag system ● Optimal access and availability of collection points to capture maximum amount of identified fractions ● Implementation of unique code provides data on traceability, consumption and consumer habits ● Creates additional communication channels towards consumers in relation to litter (app) ● Adaptable system to access other fractions ~~● Minimal risk of fraud (no cash returns, no import)~~ ~~● Minimal change for consumers in relation to the disposal~~

Cons	
● End of blue bag collection for identified fractions ● End of door-to-door collection for identified fractions ● **(Assumption).** Shift in waste transportation from intercommunales to private waste operators, potentially lowering the negotiation power to reduce cost for collection & transportation ● Significant change in waste management for households and private consumers ● **(Assumption).** Significant cost for consumers to return identified fraction ● **(Depends upon design, not proven in best-performing system).** Constraint in access and availability to sufficient collection points to allow for consumption on the go and beyond opening hours of collection points with RVMs ● Impact of implementing a deposit system for retailers (machine for returning waste infrastructure) ● Risk of fraud (Import, multiple reimbursements for same unit [tbc], ~~cash reimbursement~~)	● Significant change and costs for producers in setup phase (serialisation), especially for smaller producers ● Home scanners are not a solution for digitally impaired users and put a lot of responsibility on municipalities (set-up) ● Digitally impaired have no access for reimbursement on the go ● Implementation requires support from local authorities ● Risk of fraud (duplication of codes, hacking of the system, people taking pictures of the QR-codes in PoS) ● Risk that the redeemer does not dispose the fraction in the appropriate collection point ● Significant change in waste management for households and private consumers (scan of multiple codes, use of an app) ● Unsuitable for reuse from reverse logistic in supermarket ● No increase of recyclate quality (packaging still contaminated) ● Issues of data privacy / GDPR compliance ● Heavy backend infrastructure ● No physical support at take-back location in case of difficulties (at home / on-the-go) ● Absence of incentive for retailers to take part in the system (low Producer Responsibility) ● Risk of attracting other waste with 'Smart' bins ● Feasibility: is this system even feasible? ● Timing: Never been implemented: need (years of) further testing