Armenian Packaging Waste Management Assessment and a guide to set-up a packaging waste management system based on the principle of EPR in Armenia

Prepared for:

The American Chamber of Commerce in Armenia

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Project's Final Outcomes

- Current waste management situation in Armenia
- Packaging waste market in Armenia
- EPR in the EU and the key principles
- Assumptions of EPR models for Armenia
- PRO proposals for Armenia – 3 scenarios
- Fees calculation
- Financial Feasibility & Investments
- Potential combination of EPR with DRS
- Choosing between the different scenarios
- SWOT & Risks Analysis
- Roadmaps and timeframes for the State and the Producers

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Project's goal

To provide the basic guidelines to the State and the Industry on the establishment of an EPR ecosystem through the establishment of a Producer Responsibility Organization (PRO) for packaging in Armenia.

Development of 3 alternative scenarios for possible EPR deployment for Armenia – 1 of the 3, for parallel development with a DRS system.

The PRO proposition to be based on the EPR principles in the EU

The study is based both on the analysis of the current situation in Armenia and on various European practices and experiences

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Current situation in Armenia - Waste management

- Depends almost completely on landfilling (currently a total of 297 dumping sites).
- Poor collection services and minimal sorting at source.
- Data for Municipal Solid Waste (MSW) composition and total amount is rather limited and unreliable.
- Estimated municipal waste generated per year, per person: **193 kg/c a** for rural areas and **292 kg/c a** for urban areas[2].
- A highly active and significant informal sector, not included in the official statistical data.
- Several recycling companies working under full capacity as there are no sufficient quantities of recyclable materials.[3]

[2]Armstatbank.am. 2021. ArmStatBank. [online] Available at: <https://armstatbank.am/pxweb/hy/?rxid=c5817e01-1efe-418a-99ff-873897b796a5> [Accessed 28 December 2021].

[3] Ace.aua.am. 2021. Waste Governance in Armenia – Acopian Center for the Environment. [online] Available at: <https://ace.aua.am/waste/governance/> [Accessed 18 December 2021].

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Current situation in Armenia - Legal Framework

- No packaging recycling targets; Only available recycling targets from Decision on **Technical Regulations of Packaging Waste (1544-Ն)** which was **invalidated in October 2021.**

- Only sorting targets available:
  MSWM Strategy 2021-23 → sorting at least **10%** of waste generated by citizens and economic entities by 2025.
  MSWM System Development Strategy 2017-2036 → sorting **20%** of generated municipal solid waste by 2036.

- Introduction of **EPR systems by 2024** according to **CEPA Action Plan.**

- Very low **tariffs for waste collection and disposal** services.

- Deficiencies in the licensing of waste operators, although they are required by law **(Law on Licensing (ՀՕ-193))**.

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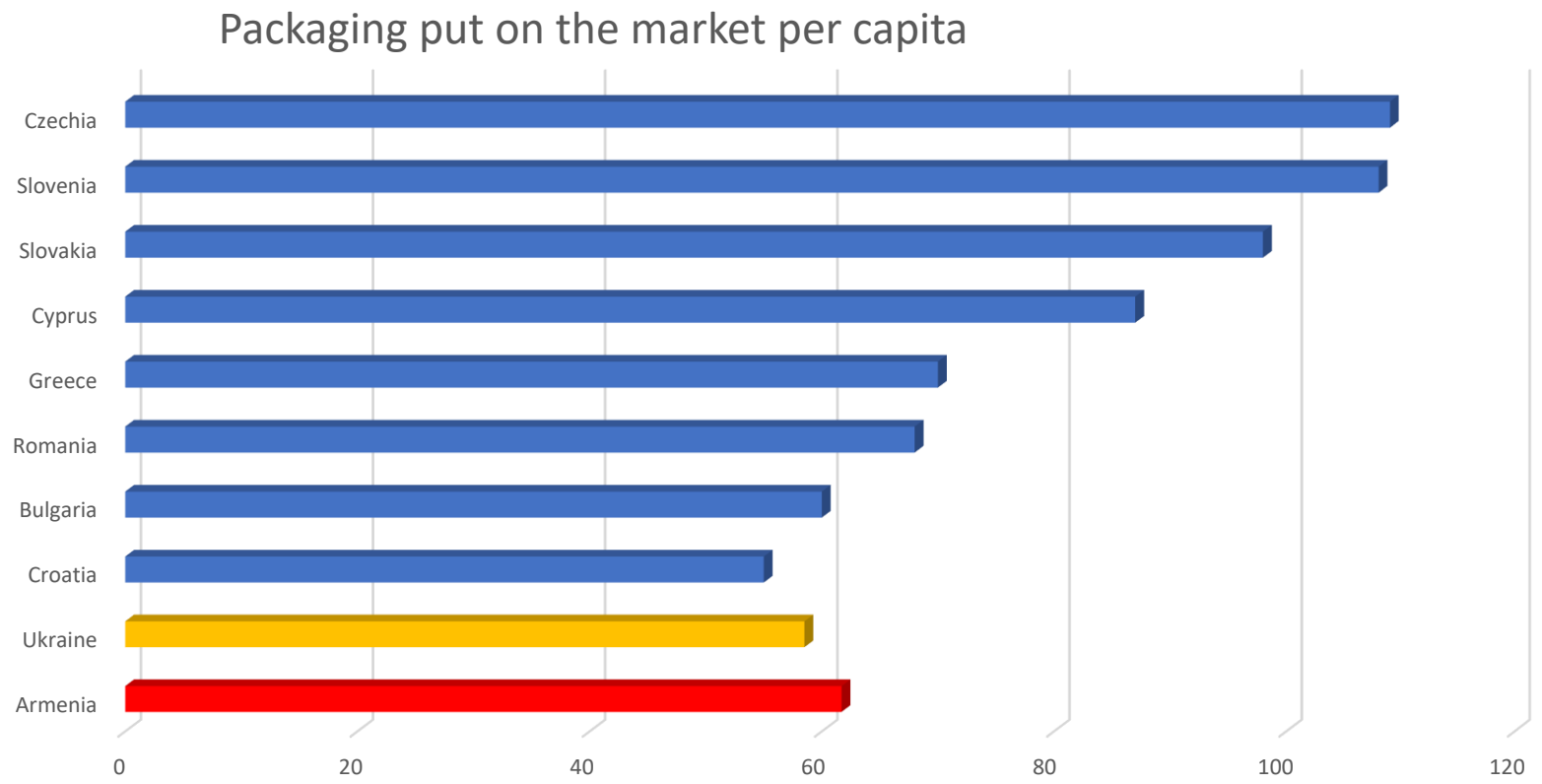
Packaging waste market - Estimates of quantity POM*



Based on a per capita packaging POM of 61.7kg/c the estimated Total Packaging POM in Armenia, is 182,922 tons

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EPR

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EPR as a solution in the EU – Key Principles

Key principles that EPR should follow:

a. **A clear separation of roles and responsibilities** of all relevant actors involved;
b. **Ownership of the EPR** limited to the obliged Producers;
c. **Not-for-profit set-up;**
d. **Measurable waste management targets;**
e. **Reporting transparency**;
f. **Equal treatment of producers** of products regardless of their origin or size;
g. **Information to consumers;**
h. **EPR transparency**;
i. **Cost coverage**, to reflect the end-of-life costs of its products;
j. **Cost efficiency,** means that an EPR scheme has a clearly defined geographical, product and material coverage;
k. **Fee modulation,** taking into consideration the products' durability, reparability, reusability, recyclability and the presence of hazardous substances;
l. **Monitoring and enforcement.**

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EPR as a solution – Key stakeholders and their role

Packaging producers

- Manufacturers and importers of products in packaging

Municipalities

- Cooperation with PRO to reach the targets
- Educational campaign for citizens

State

- Monitoring
- Reports from PRO(s) and producers
- Enforcement

PRO

Citizens

- Sorting
- Educational campaign on separate waste collection
- Indirectly payment of the packaging fees (products' prices)

Recyclers

- Production of secondary raw materials
- Production of new packaging

Waste operators (municipal/private)

- Collection, sorting of packaging waste contracted by the PRO
- Transportation of the sorting residuals to disposal or recovery
- Trade the recyclable materials on behalf of the PRO

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PRO in Armenia - Key Design Parameters/Suggestions

- ✓ Planning period of 5 years
- ✓ PRO as a legal entity is a limited liability company with shareholders and members
- ✓ PRO fully owned by the Producers
- ✓ Ownership allocation - each shareholder takes equal number of shares
- ✓ Use of the principle one company one vote for decision making at the Annual General Meeting of shareholders
- ✓ Only shareholders will have voting rights and the right to be elected in the Board of Directors
- ✓ Not for profit distribution set-up
- ✓ Initial Registration fee (once off), but not high (say 300 euros)
- ✓ Retrospective payment of fees from the day of inception of the PRO
- ✓ External professional audits
- ✓ Declaration of packaging on an annual basis for the previous year (year n-1 to be the base for paying packaging fees for year n)
- ✓ Clearing of packaging per producer each year in the first quarter of next year
- ✓ Once a producer joins the PRO, all the packaging obligations are transferred to the PRO

PRO in Armenia - Key Design Parameters/Suggestions

- ✓ Accreditation of the PRO by the State based on 5-year Business Plan and feasibility study
- ✓ PRO covering both Household and Commercial/Industrial Packaging
- ✓ Consultants proposition for reasonable targets for the 5-year planning period
- ✓ Material collected belongs to the PRO
- ✓ Use of the private waste sector or the local authorities for collection of packaging
- ✓ Sorting of material with contract with the private waste sector (suggested method)
- ✓ Commercial Industrial Packaging approached with payment of subsidies to the private waste operators
- ✓ Geographical expansion of the system is based on the needs to meet the recycling targets for the first planning period (5 years)
- ✓ Cost based fees (each material pays fees according to its contribution to the cost of the PRO)
- ✓ Use of eco-modularity in the calculation of fees, (material that are more difficult to recycle will be "penalised" with additional cost, hence have higher packaging fees)
- ✓ Use of solidarity between materials in the fee calculation (cost is shifted from some materials to others to make the fees more balanced)

PRO in Armenia – Proposal of 3 Scenarios

Scenario 1

EPR model with the collection of two separate streams of packaging material – namely the streams of glass and of the rest of the packaging

Scenario 2

EPR model with the collection of three separate streams of packaging material – namely the streams of glass, paper, and the rest of lightweight packaging (PMD)

Scenario 3*

EPR model with two packaging streams (similar to scenario 1), running in parallel with a DRS scheme for beverage packaging, as per the DRS study for Armenia[8]

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*** Model proposed is based on DRS Study for Armenia which includes the following materials: PET, Aluminium, some of the Glass**

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[8]Daiva Matonienė, International Consultant for DRS (February 2021), Introducing the Deposit Refund System for packaging waste management in the Republic of Armenia, Situation analysis and good international practices report.

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PRO in Armenia – Collection of recyclable materials

Collection Method:

- Bins placed at convenient locations for the citizens (up to 70 meters away from the household) for scenarios 1 & 2
- Two bins for scenario 1
- Three bins for scenario 2
- For scenario 3: recycling bins to be placed next to the DRS collection points at retail stores

Type of bins: Closed bell shaped bins, to avoid recyclable waste picking by the informal sector

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PRO in Armenia – Proposed Recycling Targets and Comparison with EU Targets

Armenia Recycling Targets first 5-year period **Second 5-year period**

Material	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total Packaging	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%
Paper Pack	30%	40%	45%	50%	55%	60%	65%	70%	75%	80%
Plastics	13%	17%	21%	25%	29%	34%	38%	42%	46%	50%
Glass	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%
Metal	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%
Wood	15%	17%	20%	23%	25%	28%	31%	34%	37%	40%

EU Material Specific targets

Material	2025	2030
Total Packaging	65%	70%
Paper and Cardboard	75%	85%
Plastic	50%	55%
Glass	70%	75%
Ferrous Metals	70%	80%
Aluminum	50%	60%
Wood	25%	30%

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PRO in Armenia – Analysis of Scenarios 1 and 2

Commercial/Industrial packaging waste recycled for all scenarios

C/I Material recycled by PRO to meet targets (tons)

Material	Year 1	Year 2	Year 3	Year 4	Year 5
Paper Pack	8,000	10,000	14,000	20,000	25,000
Plastics	1,500	1,800	2,000	2,300	2,600
Glass	0	0	0	0	0
Metal	200	250	300	400	500
Wood	1,300	1,800	2,500	3,500	4,000
Total	**11,000**	**13,850**	**18,800**	**26,200**	**32,100**

Household packaging waste recycled for the different scenarios

H/h Material recycled by PRO to meet targets in scenarios 1 and 2 (tons)

Material	Year 1	Year 2	Year 3	Year 4	Year 5
Paper Pack	5,196	8,477	10,842	13,014	15,068
Plastics	3,388	5,663	8,471	11,827	14,845
Glass	3,835	5,578	7,668	10,115	12,212
Metal	791	1,199	1,695	2,082	2,499
Wood	0	0	0	0	0
Total	**13,210**	**20,917**	**28,676**	**37,038**	**44,624**

H/h Material recycled by PRO to meet targets in scenario 3 (tons)

Material	Year 1	Year 2	Year 3	Year 4	Year 5
Paper Pack	5,196	8,477	10,842	13,014	15,068
Plastics	2,585	4,390	6,618	9,281	11,676
Glass	3,068	4,462	6,134	8,092	9,769
Metal	791	1,199	1,695	2,082	2,499
Wood	0	0	0	0	0
Total	**11,640**	**18,528**	**25,289**	**32,469**	**39,012**

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Fees Calculation: Cost Based formula

Fee per material (per packaging material)

$$\underline{\textit{Net Cost ((Cost to collect + Cost to sort) – Value from Sale)}}$$
$$\textit{Quantity Put on the Market (POM)}$$

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Per year and Averaging Fees Model 1

Proposed Fees with solidarity and eco-modularity

	Year 1	Year 2	Year 3	Year 4	Year 5	Average Years 1-3	Average Years 4-5
Household (figures in EUR per ton)	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**		
Glass	77.4	75.23	64.54	55.62	55.36	72	55
Paper	86.07	106.81	101.65	84.85	83.86	98	84
Steel	83.38	89.84	82.78	72.94	72.48	85	73
Aluminium	44.09	55.69	52.11	44.89	42.75	51	44
PET	79.96	92.51	88.11	80.79	79.12	87	80
HDPE	82.79	95.78	92.33	83.15	81.78	90	82
Film	115.1	126.11	118.08	109.89	108.26	120	109
Drink cartons	130.67	122.34	115.6	110.79	109.57	123	110
Other recoverable	256.38	308.58	301.5	282.67	280.08	289	281
Other non-recoverable	292.87	331.19	318.81	302.42	299	314	301
Commercial (figures in EUR per tonne)							
Paper	22.47	18.16	15.5	14.56	14.49	19	15
Plastic	16.17	12.55	8.5	6.43	5.78	12	6
Wood	7.03	6.29	5.33	4.91	4.46	6	5
Metal	10.55	8.13	5.67	4.74	4.32	8	5

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Per year and Averaging Fees Model 2

Proposed Fees with solidarity and eco-modularity

	Year 1	Year 2	Year 3	Year 4	Year 5	Average Years 1-3	Average Years 4-5
Household (figures in EUR per ton)	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**	**with solidarity and eco-modularity**		
Glass	85.62	80.01	69.43	64.35	61.47	78	63
Paper	86.2	77.51	65.33	59.23	55.18	76	57
Steel	76.39	73.46	73.54	70.25	67.85	74	69
Aluminium	36.81	37	37.36	33.75	30.95	37	32
PET	69.42	67.47	66.61	60.84	57.36	68	59
HDPE	75.24	74.15	73.81	66.03	62.42	74	64
Film	119.19	118.05	117.73	113.43	111.44	118	112
Drink cartons	113.09	110.09	110.1	105.29	104.35	111	105
Other recoverable	192.37	189.22	188.79	177.36	176.09	190	177
Other non-recoverable	232.82	231.3	230.85	214.74	212.75	232	214
Commercial (figures in EUR per ton)							
Paper	22.47	18.16	15.5	14.56	14.49	19	15
Plastic	16.17	12.55	8.5	6.43	5.78	12	6
Wood	7.03	6.29	5.33	4.91	4.46	6	5
Metal	10.55	8.13	5.67	4.74	4.32	8	5

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Financial Feasibility Model 1

Surplus/Deficit account – Different yearly fees (Option 1)

	Year 1	Year 2	Year 3	Year 4	Year 5
	€	€	€	€	€
Cumulative Surplus	78,787	902,324	2,176,869	3,425,130	4,714,341

Surplus/Deficit account - Averaging of Fees Year 1-3 and Years 4-5 (Option 2)

	Year 1	Year 2	Year 3	Year 4	Year 5
	€	€	€	€	€
Cumulative Surplus	341,247	870,085	2,417,619	3,623,499	5,046,105

Both options make the PRO financially feasible:

Option 1 creates lower initial fees that are easier for the industry to accept

Option 2 is more prudent and creates better reserves for the PRO

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*** Financial results consider increased income by 10% due to retrospective fees. If this is not accepted by authorities, fees will need to go up by 10% to provide the same results**

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Investments by PRO or by waste operators in Sorting Stations, Bins, Trucks.

Trucks	5 Year Total
Scenario 1	
Number of press trucks needed	42
Number of open trucks needed	25
Total Investment trucks NEW (€)	8782567
Total Investment trucks USED (€)	2300196
Scenario 2	
Number of press trucks needed	33
Number of press trucks needed	17
Number of open trucks needed	25
Total Investment trucks NEW (€)	10037219
Total Investment trucks USED (€)	2634770
Scenario 3	
Number of press trucks needed	42
Number of open trucks needed	25
Total Investment trucks NEW (€)	8782567
Total Investment trucks USED (€)	2300196

Bins	5 Year Total
Scenario 1 No. of bins needed	11710
Investment (€)	6440549
Scenario 2 No. of bins needed	14219
Investment (€)	7820667
Scenario 3 No. of bins needed	9480
Investment (€)	5213778

	Number of Hand Sorting stations required	Total Investment required	Number of Automated sorting stations required	Total Investment Required
Scenario 1	5	4m	1	4m
Scenario 2	5	4m	1	3.2m
Scenario 3	4	3.2m	1	4m

*number of stations required for one type of sorting station: either only hand sorting or automated sorting.

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The Alternative(?) of the implementation of DRS – (Scenario 3)

DRS Mechanics

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Basic Parameters of a DRS solution

- DRS places a surcharge on a product's price when purchased and provides a rebate when the product, or its packaging is returned,
- Can be voluntary and/or mandated by legislation,
- **DRS: quicker collection and recycling results for certain packaging materials - fight against littering**
- DRS can only be considered as a complementary system and not a sole alternative to the EPR
- Regarding packaging, DRS use has been limited where it is utilized, to the beverage containers, returnable or single use, (10% of packaging or 15% of household packaging, in Armenia)
- The mandatory DRS systems have been in many cases successful in reducing littering and in achieving significant collection and recycling rates for one-way beverage packaging,
- There are however specific issues around the financial, social and environmental impacts of the DRS solutions, that need close attention. Negative impacts of combination of EPR with DRS in all the sustainability parameters (e.g. **More polluting process, Greater cost for society, More dedication of time and space for citizens)**
- The majority of the high performing countries in the EU achieve their results with EPR only (without the use of the DRS in parallel)

Recycling rate of packaging waste, 2019

(%)

(1) Eurostat estimate.
(2) 2018 data instead of 2019.
(3) Estimate.
(4) 2017 data instead of 2019.

Source: Eurostat (online data code: env_waspacr)

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Combination of EPR and DRS – Scenario - Model 3

- Scenario 3, proposes an alternative design of the EPR, if the DRS is implemented in the country, to limit the wastage of resources.
- Armenia DRS Study in 2021[9]: Based on the proposed DRS, the scheme would cover around 15,000 – 18,000 tons of beverage packaging, which is around 10% of the packaging put on the Armenian market.
- Estimated around 3,000 retail collection points for the DRS scheme (both automated and manual).
- EPR in scenario 3, is designed with two collection streams (glass and mixed packaging) to reflect the fact that a significant part of the more valuable materials (PET and Aluminium) is transferred to the DRS scheme.
- The EPR design was optimised to reflect the new conditions, with EPR collection bins placed mainly next to the DRS collection points at retail stores, for convenience to the public.

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[9]Daiva Matonienė, International Consultant for DRS (February 2021), Introducing the Deposit Refund System for packaging waste management in the Republic of Armenia, Situation analysis and good international practices report.

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Per year and Averaging Fees Model 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Average Years 1-3	Average Years 4-5
Household (figures in EUR per ton)	with solidarity and eco-modularity	with solidarity and eco-modularity	with solidarity and eco-modularity	with solidarity and eco-modularity	with solidarity and eco-modularity	-	-
Glass	81.48	79.55	68.47	58.89	57.02	77	58
Paper	103.33	132.35	120.46	104.6	99.7	119	102
Steel	95.65	117.61	108.17	98.28	97.15	107	98
Aluminium							
PET							
HDPE	78.66	85.59	78.98	74.35	72	81	73
Film	102.72	129.65	132.72	112.72	114.49	122	114
Drink cartons	122.94	156.59	156.79	134.93	140.11	145	138
Other recoverable	226.45	276.25	256.42	262.41	252.86	253	258
Other non-recoverable	245.2	315.05	281.14	279.37	279.19	280	279
Commercial (figures in EUR per ton)						-	-
Paper	21.67	17.23	15.14	14.36	14.41	18	14
Plastic	15.6	11.91	8.3	6.34	5.75	12	6
Wood	6.78	5.97	5.21	4.84	4.44	6	5
Metal	10.16	7.69	5.52	4.67	4.29	8	4

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Comparison of fees between models – between countries

	2 - stream model	3 - steam model	2 - stream model with DRS
Household (figures in EUR per tonne)	Average 5 yrs	Average 5 yrs	Average 5 yrs
Glass	66	72	69
Paper	93	69	112
Steel	80	72	103
Aluminium	48	35	
PET	84	64	
HDPE	87	70	78
Film	115	116	118
Drink cartons	118	109	142
Other recoverable	286	185	255
Other non-recoverable	309	224	280
Commercial (figures in EUR per tonne)			
Paper	17	17	17
Plastic	10	10	10
Wood	6	6	5
Metal	7	7	6

	Armenia	Bulgaria	Czech	Spain	Netherlands	Belgium	Romania	Cyprus
Household (€/ton)								
		2016						
Glass	72.2	30.7	66.4	19,7 + €0,0028/unit	56.0	23.9	49.7	29.1
Paper	68.7	57.3	100.1	68.0	22.0	18.5	24.6	47.1
Steel	72.3	21.0	57.7	85.0	20.0	84.8	26.9	95.4
Aluminium	35.2	73.6	76.9	102.0	20.0	35.3	36.6	21.4
PET	64.3	80.3	142.9	377.0	640.0	147.1	28.9	105.9
HDPE	70.3	80.3	142.9	377.0	640.0	147.1	25.4	105.9
Film	116.0	80.3	189.6	472.0	640.0	287.3	25.4	131.5
Drink cartons	108.6	99.2	141.4	323.0	180.0	249.8	25.4	112.7
Other	204.5	132.4	203.1	472.0	770.0	287.2	25.4	157.3
Commercial (€/ton)								
Paper	17.0		11.5			14.5		43.3
Plastic	9.9		21.0			39.5		37.9
Wood	5.6		11.8			14.5	21.3	12.4
Other	6.7		21.0			53.0		50.3

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Evaluation of scenarios

If only EPR is implemented → where the EPR application would be the fundamental packaging solution and precede any potential application of the DRS, the analyses demonstrate that the best scenario financially would be a PRO collecting **three streams of packaging** (PMD, Paper and Glass) in bell-shaped bins. However, design is also dependent on other parameters (i.e. space for bins, potential for curbside collection etc.)

If EPR will be implemented in parallel to the DRS → in which case people will have a financial incentive to return their DRS packaging to the collection points, then the authors propose to adjust the EPR system and use a **two-stream system** with bins placed next to the DRS collection points. Aim should be to find synergies between the two systems and optimise the design of both, from the beginning.

Irrespective of the scenario chosen, **EPR will be the fundamental system for the management of packaging** as it will take responsibility for at least **85 – 90% of the packaging put on the market in Armenia.**

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Thank you

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