Life cycle assessment of various ALPLA packaging units and alternative materials - COUNTRY

Version 1.2

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Starting point

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- In a nutshell, the public perception of beverage packaging is as follows:
  - Plastic bottles and aluminium cans have a negative environmental image
  - In most cases, glass bottles have a positive environmental image
- The political parameters include, for example:
  - The EU's circular economy package
  - EU Directive on Single-Use Plastics
    - Product design
    - Extended producer responsibility
    - Targets for separate collection
- Do public perception and the current political parameters tally with the facts and figures?

Aim of the analysis

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- The aim of the analysis is to calculate a **life cycle assessment** in line with ISO 14044 for PET **packaging units** and alternative packaging materials for certain beverages, foods and Liquid Detergents which are consumed via the food retail sector in ten countries.
- The purpose of the life cycle assessment is to promote an **objective discussion** of the environmental evaluation of the beverage packaging examined on the basis of the latest set of data.
- The results of the life cycle assessment are confirmed by an independent **reviewer**.

Scope of the analysis

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- The entire analysis comprised 59 material-content combinations for **brand name products typically found in Austria**. The packaging units are not necessarily representative of the market. The aim is not to depict the mix of packaging units found in the Austrian market.

content	capacity [l]	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	HDPE OW	rHDPE 50% OW	rHDPE 100% OW	PP OW	Pouch OW	Glass OW	Glass MW	Alu-can OW	Fe-can OW	beverage carton OW	
water	1,0	×	×	×	×	×	×						×	×				8
milk	1,0	×	×	×				×	×	×			×	×			×	9
juice	1,0	×	×	×									×	×			×	6
beer	0,5	×	×	×									×	×	×			6
CSD	0,5	×	×	×	×	×	×						×	×	×			9
food jar	0,35	×	×	×									×			×		5
ketchup	0,30	×	×	×				×	×	×	×		×					8
detergent	1,5	×	×	×				×	×	×	×	×						8
		8	8	8	2	2	2	3	3	3	2	1	7	5	2	1	2	59

- The entire analysis comprised following countries:
  - Austria, Brazil, China, Germany, India, Mexico, Poland, South Africa, Turkey and The United States of America
  - **Country variations**:
    - The mass of the container is not changed!
    - Waste management conditions (separate collection and recycling), electricity mix, transport distances, dataset Europa versus Rest of World

Procedure

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1. **Definition** of functional unit and system boundary per content
2. **Data collection**: Production of raw materials, supply of energy and fuels, transport distances, filling, washing, distribution to retailer and waste management conditions
3. **Transformation** of life cycle data into environmental impacts
4. **Accounting** of the entire life cycle
5. **External review** and sensitivity analysis
6. **Interpretation** of results

Functional unit

- Functional unit filling volumes
  - 1 litre of mineral water
  - 1 litre of milk
  - 0.5 litres of carbonated soft drink (CSD)
  - 1.5 l of Liquid Detergent
  - 350 ml of food
- The product system comprises:
  - **Packaging unit**, closure and label
  - Sales packaging (carton tray, reusable crate, film)
  - Transport packaging (pallets, shrink wrap)
  - Packaging for delivery of packaging units, lids, etc. to the bottler
- The analysis covers the packaging units' **entire life cycle**:
  - Generation of raw materials and energy sources
  - Packaging manufacture
  - Filling and cleaning of reusable packaging units
  - Distribution from the bottler to the food retailers
  - Collection, recycling and disposal of the packaging units and other packaging
  - Other transport processes and supply transports

Wirkungskategorien und Sachbilanzgrößen

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- Impact categories
  - Climate change [kg CO_2-eq.] (IPCC 2013)
  - Acidification potential [kg SO_2-eq.] (CML)
  - Summer smog [kg ethylene.] (ILCD 1.0.8 2016)
  - Terrestrial eutrophication [mol N-eq.] (ILCD 1.0.8 2016)
  - Freshwater eutrophication [kg P-eq.] (ILCD 1.0.8 2016)
  - Marine eutrophication[kg N-eq.] (ILCD 1.0.8 2016)
- Life cycle inventory analysis parameters
  - Depletion of abiotic resources – mineral raw materials [kg SB-eq.]
  - Cumulative energy demand - total [MJ-eq.]
  - Cumulative energy demand – non-renewable [MJ-eq.]
  - Cumulative energy demand –renewable [MJ-eq.]
  - Land use [m².a]
  - Particulates [PM < 2,5 µm] (CML)
  - Waster consumption [l] (CML)

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Input data

container, cap, label, transport distances to retailer, waste management

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MEMBER OF TEAM ZF

Container

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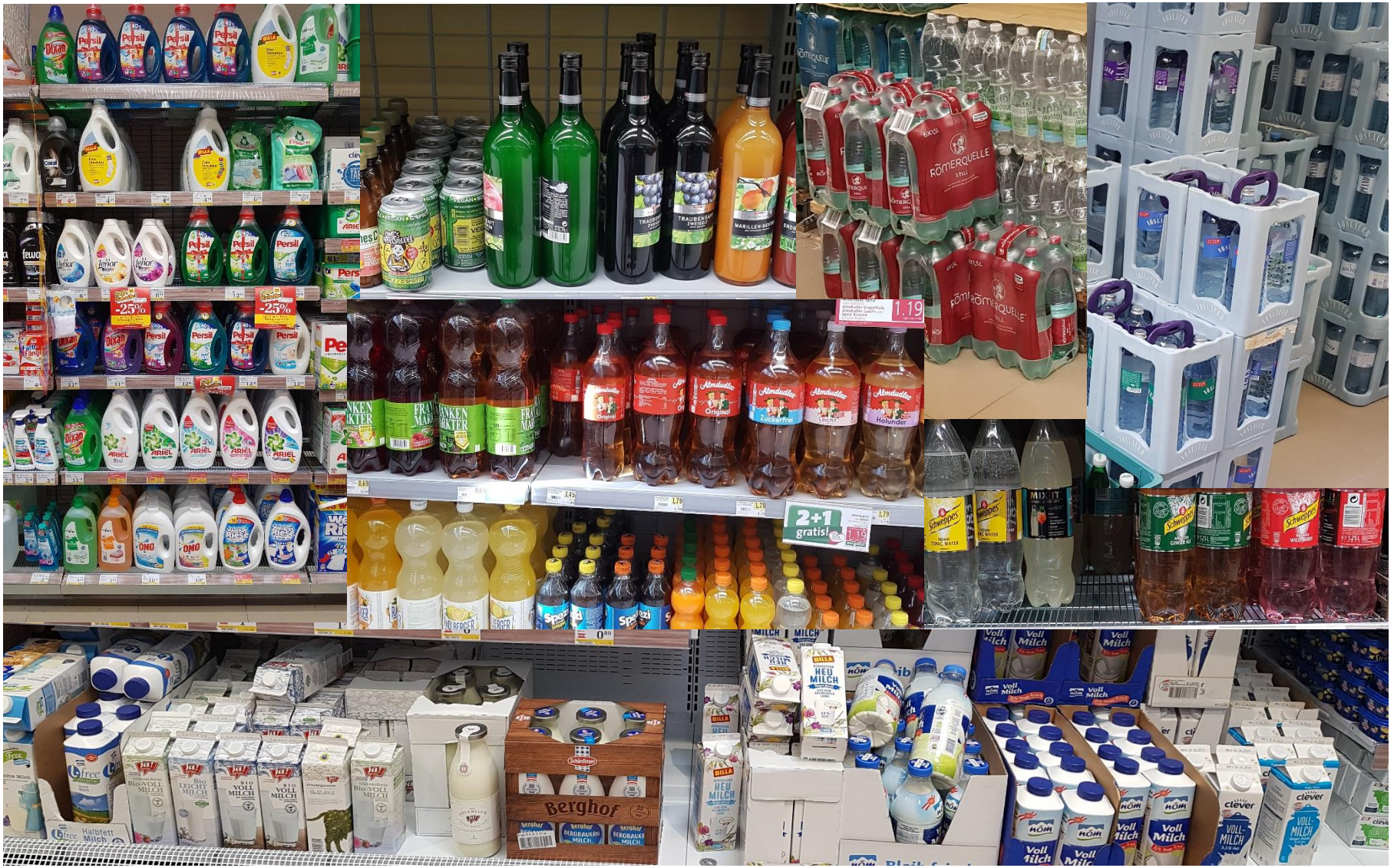

Input data Water 1,0 l

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water 1,0 l	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW
volume	[ml]	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
cycles	[-]	1	1	1	20	20	20	1	30
mass of container	[g]	24,9	24,9	24,9	65,0	65,0	65,0	470,0	551,9
material cap	[-]	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	Tinplate	Alu
mass cap	[g]	3,00	3,00	3,00	3,00	3,00	3,00	2,20	1,70
material label	[-]	PET	PET	PET	paper	paper	paper	paper	paper
mass label	[g]	0,35	0,35	0,35	1,00	1,00	1,00	1,00	1,00
mass product system: container, cap & label	[g]	28,26	28,26	28,26	69,00	69,00	69,00	473,20	554,58

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW
container per tray/box	[pieces]	4	4	4	9	9	9	12	12
mass materials single use	[g]	12,16	12,16	12,16	0,26	0,26	0,26	-	-
mass materials multiple use	[g]	-	-	-	1.750,00	1.750,00	1.750,00	2.500,00	1.750,00

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW
container per palette	[pieces]	576	576	576	396	396	396	384	384
mass materials single use	[g]	5.001	5.001	5.001	101	101	101	-	-
mass materials multiple use	[g]	24.000	24.000	24.000	25.750	25.750	25.750	26.500	25.750

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW
mass for transport total	[kg]	22.429	22.429	22.429	18.880	18.880	18.880	17.412	16.247
delivery step 1 outbound	[km]	220	220	220	220	220	220	220	220
delivery step 1 inbound	[km]	66	66	66	220	220	220	66	220
delivery step 2 outbound	[km]	50	50	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50	50	50
delivery total	[km]	360	360	360	500	500	500	360	500
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%	50%	50%

Input data
Milk 1,0 l

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milk 1,0 l	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	Glass OW	Glass MW	Carton
volume	[ml]	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
cycles	[-]	1	1	1	1	1	1	1	15	1
mass of container	[g]	22,10	22,10	22,10	18,80	18,80	18,80	420,00	493,17	25,00
material cap	[-]	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	Tinplate	Tinplate	HDPE
mass cap	[g]	2,67	2,67	2,67	1,65	1,65	1,65	4,02	4,02	8,00
material label	[-]	PET	PET	PET	paper	paper	paper	paper	paper	no label
mass label	[g]	3,16	3,16	3,16	1,50	1,50	1,50	1,78	1,78	-
mass product system: container, cap & label	[g]	27,93	27,93	27,93	21,95	21,95	21,95	425,80	498,97	33,00

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	Glass OW	Glass MW	Carton
container per tray/box	[pieces]	12	12	12	12	12	12	6	6	12
mass materials single use	[g]	150,28	150,28	150,28	140,20	140,20	140,20	165,20	0,20	122,20
mass materials multiple use	[g]	-	-	-	-	-	-	-	1.200,00	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	Glass OW	Glass MW	Carton
container per palette	[pieces]	864	864	864	864	864	864	408	306	624
mass materials single use	[g]	2.967	2.967	2.967	3.352	3.352	3.352	172	172	172
mass materials multiple use	[g]	24.000	24.000	24.000	24.000	24.000	24.000	24.000	25.200	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	Glass OW	Glass MW	Carton
mass for transport total	[kg]	24.074	24.074	24.074	23.931	23.931	23.931	20.365	17.954	22.279
delivery step 1 outbound	[km]	165	165	165	165	165	165	165	165	165
delivery step 1 inbound	[km]	165	165	165	165	165	165	165	165	165
delivery step 2 outbound	[km]	50	50	50	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50	50	50	50
delivery total	[km]	400	400	400	400	400	400	400	400	400
cooling lorry needed (1 = yes)	[-]	1	1	1	1	1	1	1	1	1

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	Glass OW	Glass MW	Carton
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%	50%	50%	50%

Input data
Juice 1,0 l

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juice 1,0 l	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	Carton
volume	[ml]	1.000	1.000	1.000	1.000	1.000	1.000
cycles	[-]	1	1	1	1	20	1
mass of container	[g]	28,26	28,26	28,26	516,20	637,00	33,67
material cap	[-]	HDPE	HDPE	HDPE	Alu	Alu	HDPE
mass cap	[g]	3,00	3,00	3,00	1,33	1,18	3,91
material label	[-]	PP	PP	PP	paper	paper	no label
mass label	[g]	1,31	1,31	1,31	1,71	4,80	-
mass product system: container, cap & label	[g]	32,57	32,57	32,57	519,24	642,98	37,58

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	Carton
container per tray/box	[pieces]	6	6	6	6	8	10
mass materials single use	[g]	16,50	16,50	16,50	-	-	160,00
mass materials multiple use	[g]	-	-	-	2.000,00	2.000,00	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	Carton
container per palette	[pieces]	792	792	792	384	384	840
mass materials single use	[g]	3.201	3.201	3.201	2.000	-	3.651
mass materials multiple use	[g]	24.000	24.000	24.000	26.000	26.000	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	Carton
mass for transport total	[kg]	23.721	23.721	23.721	23.596	24.029	23.729
delivery step 1 outbound	[km]	275	275	275	275	275	275
delivery step 1 inbound	[km]	55	55	55	55	275	55
delivery step 2 outbound	[km]	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50
delivery total	[km]	400	400	400	400	600	400
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	Carton
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%

Input data
Beer 0,5 l

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beer 0,5 l	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	ALU can
volume	[ml]	500	500	500	500	500	500
cycles	[-]	1	1	1	1	30	1
mass of container	[g]	31,20	31,20	31,20	278,00	374,00	12,80
material cap	[-]	HDPE	HDPE	HDPE	Tinplate	Tinplate	Alu
mass cap	[g]	2,30	2,30	2,30	2,20	2,20	2,50
material label	[-]	paper	paper	paper	paper	paper	no label
mass label	[g]	1,50	1,50	1,50	1,50	1,50	-
mass product system: container, cap & label	[g]	35,00	35,00	35,00	281,70	377,70	15,30

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	ALU can
container per tray/box	[pieces]	18	18	18	24	20	24
mass materials single use	[g]	20,50	20,50	20,50	340,42	-	106,28
mass materials multiple use	[g]	-	-	-	-	1.860,00	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	ALU can
container per palette	[pieces]	1.296	1.296	1.296	1.080	800	1.728
mass materials single use	[g]	3.451	3.451	3.451	2.951	1	3.451
mass materials multiple use	[g]	24.000	24.000	24.000	24.000	25.860	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	ALU can
mass for transport total	[kg]	18.779	18.779	18.779	23.049	20.815	24.064
delivery step 1 outbound	[km]	220	220	220	220	220	220
delivery step 1 inbound	[km]	44	44	44	44	220	44
delivery step 2 outbound	[km]	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50
delivery total	[km]	340	340	340	340	500	340
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	Glass MW	ALU can
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%

Input data
Carbonated Soft Drinks (CSD) 0,5 l

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CSD 0,5 l	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW	ALU can
volume	[ml]	500	500	500	500	500	500	500	500	500
cycles	[-]	1	1	1	20	20	20	1	30	1
mass of container	[g]	20,76	20,76	20,76	45,00	45,00	45,00	335,00	385,00	12,80
material cap	[-]	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	Alu	Alu	Alu
mass cap	[g]	2,18	2,18	2,18	3,00	3,00	3,00	1,50	1,50	2,65
material label	[-]	PP	PP	PP	PET	PET	PET	paper	paper	no label
mass label	[g]	0,28	0,28	0,28	0,30	0,30	0,30	1,50	1,50	-
mass product system: container, cap & label	[g]	23,22	23,22	23,22	48,30	48,30	48,30	338,00	388,00	15,45

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW	ALU can
container per tray/box	[pieces]	12	12	12	12	12	12	6	20	24
mass materials single use	[g]	8,85	8,85	8,85	-	-	-	169,15	-	105,50
mass materials multiple use	[g]	-	-	-	1.750,00	1.750,00	1.750,00	-	2.000,00	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW	ALU can
container per palette	[pieces]	1.296	1.296	1.296	840	840	840	864	800	1.728
mass materials single use	[g]	3.451	3.451	3.451	1	1	1	3.451	1	3.451
mass materials multiple use	[g]	24.000	24.000	24.000	25.750	25.750	25.750	24.000	26.000	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW	ALU can
mass for transport total	[kg]	18.369	18.369	18.369	15.784	15.784	15.784	20.172	21.174	24.069
delivery step 1 outbound	[km]	275	275	275	275	275	275	275	275	275
delivery step 1 inbound	[km]	55	55	55	275	275	275	55	275	55
delivery step 2 outbound	[km]	50	50	50	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50	50	50	50
delivery total	[km]	400	400	400	600	600	600	400	600	400
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	PET MW	rPET 50% MW	rPET 100% MW	Glass OW	Glass MW	ALU can
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%	50%	50%	50%

Input data
Food 350 ml

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food jar 0,35 l	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	FE can
volume	[ml]	350	350	350	310	420
cycles	[-]	1	1	1	1	1
mass of container	[g]	19,19	19,19	19,19	162,66	46,05
material cap	[-]	PP	PP	PP	Tinplate	Tinplate
mass cap	[g]	9,54	9,54	9,54	11,50	10,02
material label	[-]	paper	paper	paper	paper	paper
mass label	[g]	1,00	1,00	1,00	0,80	1,78
mass product system: container, cap & label	[g]	29,73	29,73	29,73	174,96	57,85

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	FE can
container per tray/box	[pieces]	6	6	6	6	6
mass materials single use	[g]	161,00	161,00	161,00	161,00	161,00
mass materials multiple use	[g]	-	-	-	-	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	FE can
container per palette	[pieces]	1.920	1.920	1.920	1.680	1.824
mass materials single use	[g]	4.355	4.355	4.355	5.605	6.355
mass materials multiple use	[g]	24.000	24.000	24.000	24.000	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	FE can
mass for transport total	[kg]	21.033	21.033	21.033	23.125	24.723
delivery step 1 outbound	[km]	330	330	330	330	330
delivery step 1 inbound	[km]	66	66	66	66	66
delivery step 2 outbound	[km]	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50
delivery total	[km]	460	460	460	460	460
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	Glass OW	FE can
allocation benefit recycling	[%]	50%	50%	50%	50%	50%

Input data
Ketchup 330 ml

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ketchup 0,3 l	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Glass OW
volume	[ml]	320	320	320	370	370	370	270	330
cycles	[-]	1	1	1	1	1	1	1	1
mass of container	[g]	21,85	21,85	21,85	25,45	25,45	25,45	22,21	191,09
material cap	[-]	PP	PP	PP	PP	PP	PP	PP	Tinplate
mass cap	[g]	3,39	3,39	3,39	6,93	6,93	6,93	4,60	3,17
material label	[-]	PP	PP	PP	PP	PP	PP	PP	paper
mass label	[g]	0,76	0,76	0,76	1,51	1,51	1,51	0,65	0,76
mass product system: container, cap & label	[g]	26,00	26,00	26,00	33,89	33,89	33,89	27,46	195,02

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Glass OW
container per tray/box	[pieces]	6	6	6	6	6	6	6	6
mass materials single use	[g]	134,00	134,00	134,00	134,00	134,00	134,00	134,00	138,00
mass materials multiple use	[g]	-	-	-	-	-	-	-	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Glass OW
container per palette	[pieces]	1.920	1.920	1.920	1.920	1.920	1.920	1.920	1.680
mass materials single use	[g]	6.757	6.757	6.757	6.757	6.757	6.757	6.751	7.350
mass materials multiple use	[g]	24.000	24.000	24.000	24.000	24.000	24.000	24.000	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Glass OW
mass for transport total	[kg]	19.187	19.187	19.187	22.077	22.077	22.077	16.764	24.753
delivery step 1 outbound	[km]	330	330	330	330	330	330	330	330
delivery step 1 inbound	[km]	66	66	66	66	66	66	66	66
delivery step 2 outbound	[km]	50	50	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50	50	50
delivery total	[km]	460	460	460	460	460	460	460	460
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0	0	0

waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Glass OW
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%	50%	50%

Input data
Liquid Detergent 1,5 l

c7-consult
sustainable performance

detergent 1,5 l	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Pouch
volume	[ml]	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.800
cycles	[-]	1	1	1	1	1	1	1	1
mass of container	[g]	91,50	91,50	91,50	101,10	101,10	101,10	122,50	42,25
material cap	[-]	PP	PP	PP	PP	PP	PP	PP	HDPE
mass cap	[g]	9,30	9,30	9,30	6,90	6,90	6,90	25,40	3,80
material label	[-]	paper	paper	paper	paper	paper	paper	paper	no label
mass label	[g]	2,00	2,00	2,00	2,00	2,00	2,00	2,00	-
mass product system: container, cap & label	[g]	102,80	102,80	102,80	110,00	110,00	110,00	149,90	46,05

secondary packaging / sales packaging	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Pouch
container per tray/box	[pieces]	4	4	4	4	4	4	4	5
mass materials single use	[g]	181,00	181,00	181,00	181,00	181,00	181,00	181,00	161,00
mass materials multiple use	[g]	-	-	-	-	-	-	-	-

tertiary packaging / transport packaging per palette	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Pouch
container per palette	[pieces]	528	528	528	528	528	528	528	450
mass materials single use	[g]	5.158	5.158	5.158	5.158	5.158	5.158	5.151	4.351
mass materials multiple use	[g]	24.000	24.000	24.000	24.000	24.000	24.000	24.000	24.000

delivery to retailer	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Pouch
mass for transport total	[kg]	23.383	23.383	23.383	23.481	23.481	23.481	24.029	22.713
delivery step 1 outbound	[km]	330	330	330	330	330	330	330	330
delivery step 1 inbound	[km]	33	33	33	33	33	33	33	33
delivery step 2 outbound	[km]	50	50	50	50	50	50	50	50
delivery step 2 inbound	[km]	50	50	50	50	50	50	50	50
delivery total	[km]	430	430	430	430	430	430	430	430
cooling lorry needed (1 = yes)	[-]	0	0	0	0	0	0	0	0

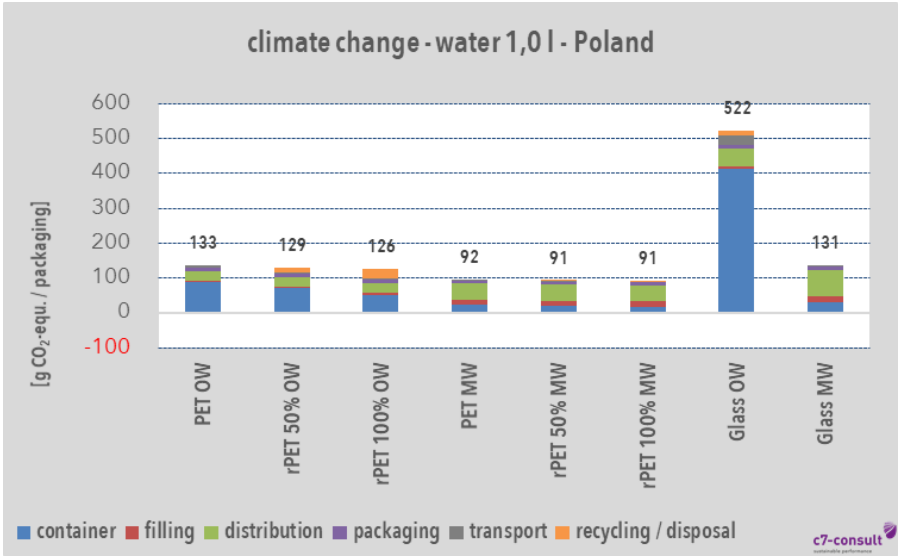
waste management	unit	PET OW	rPET 50% OW	rPET 100% OW	HDPE	rHDPE 50%	rHDPE 100%	PP	Pouch
allocation benefit recycling	[%]	50%	50%	50%	50%	50%	50%	50%	50%

c7-consult
sustainable performance

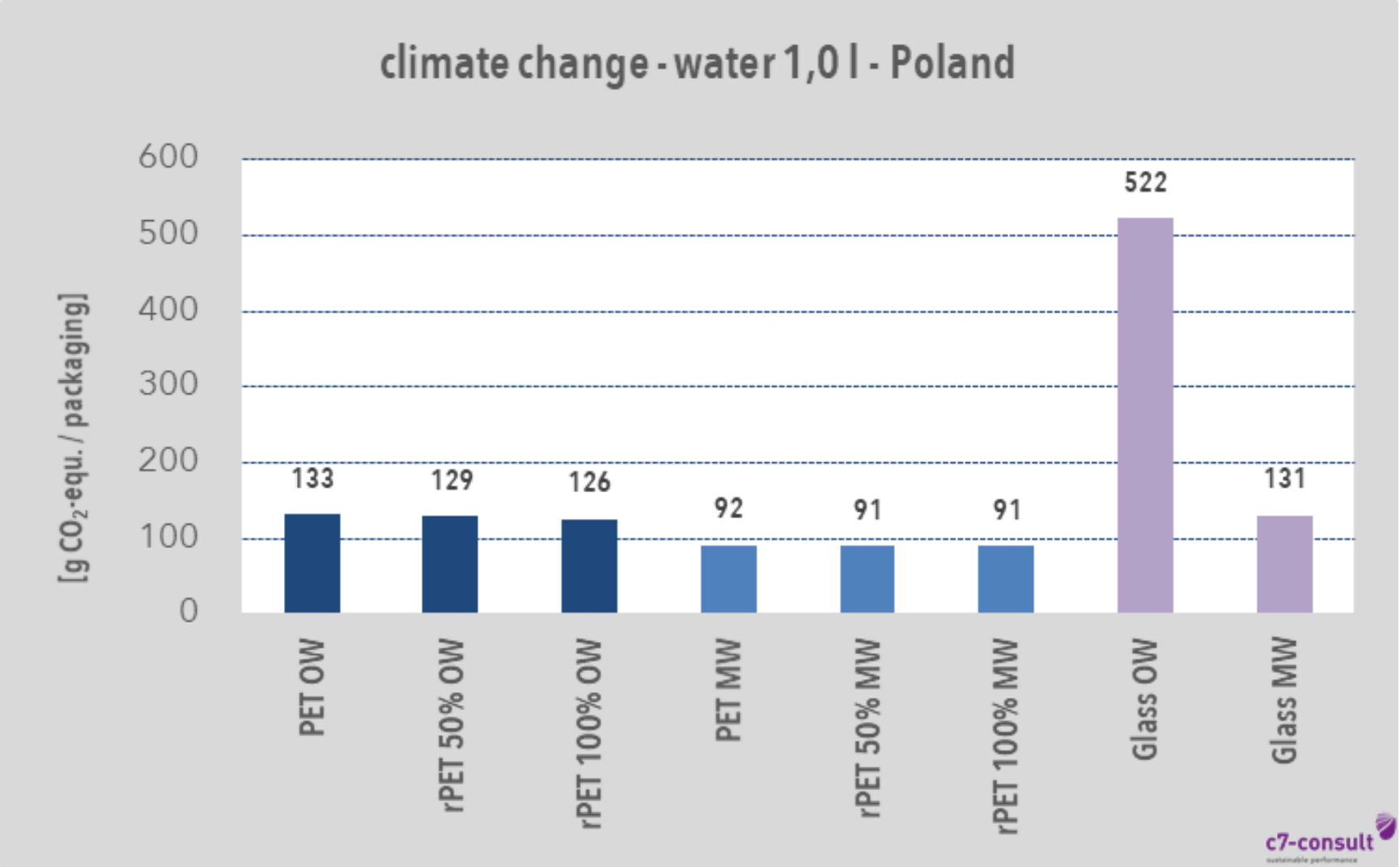
Results Water 1,0 l

Water

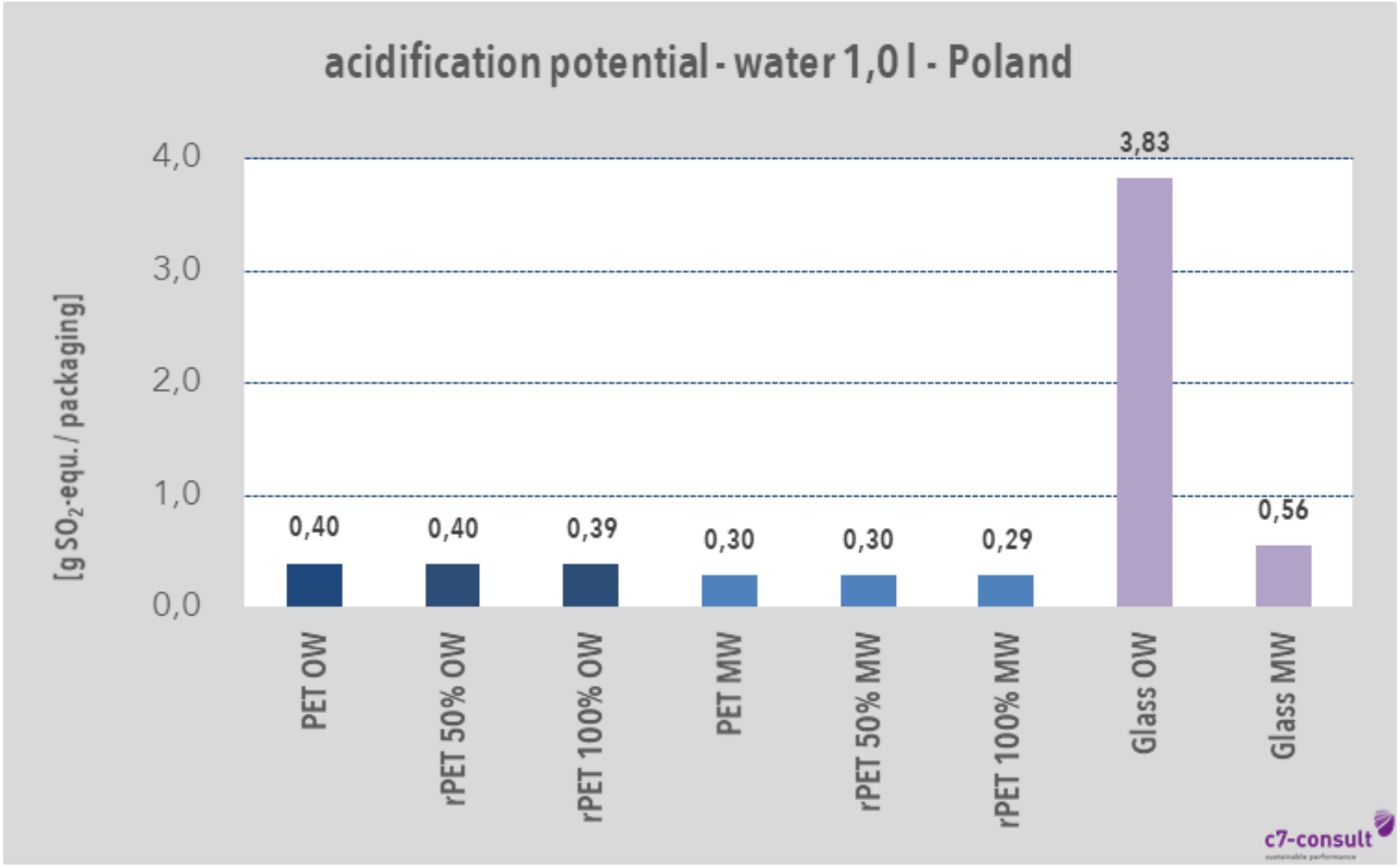
- Results cover total life cycle
  - **Bottle**: container, cap & label
  - **Filling**: filling & washing of returnable bottles
  - **Distribution**: delivery to retailer & back to bottler
  - **Packaging**: secondary & tertiary packaging including recycling
  - **Transport**: other transports like raw materials, container and cap to bottler, etc. as well as to recycling plants and final disposal
  - **Recycling / disposal**: material and energetic recovery of container, cap an label in 1. recycling step and final disposal.



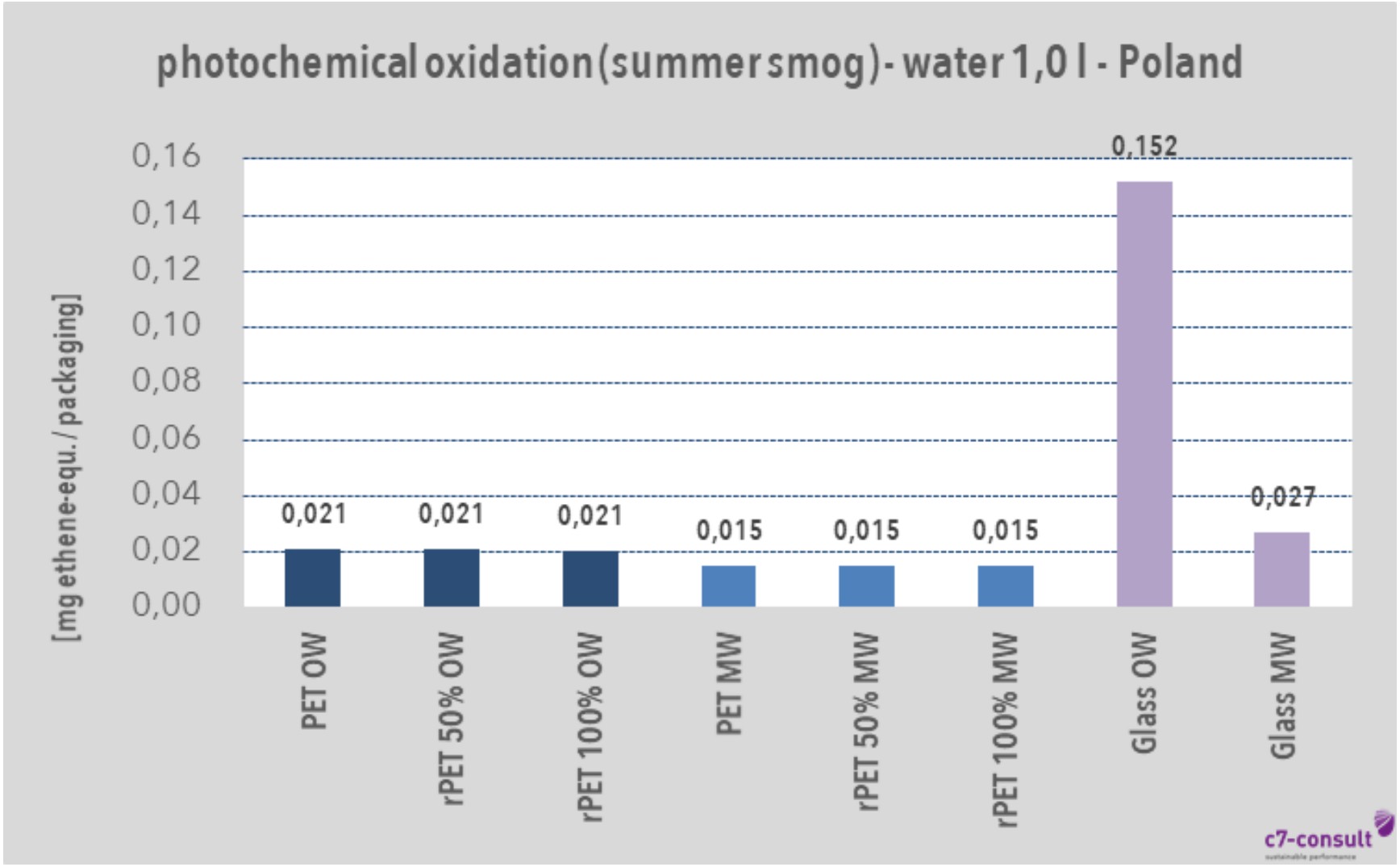
Water


climate change - water 1,0 l - Poland
[g CO2-equ. / packaging]
600
500
400
300
200
100
0
133
129
126
92
91
91
522
131
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

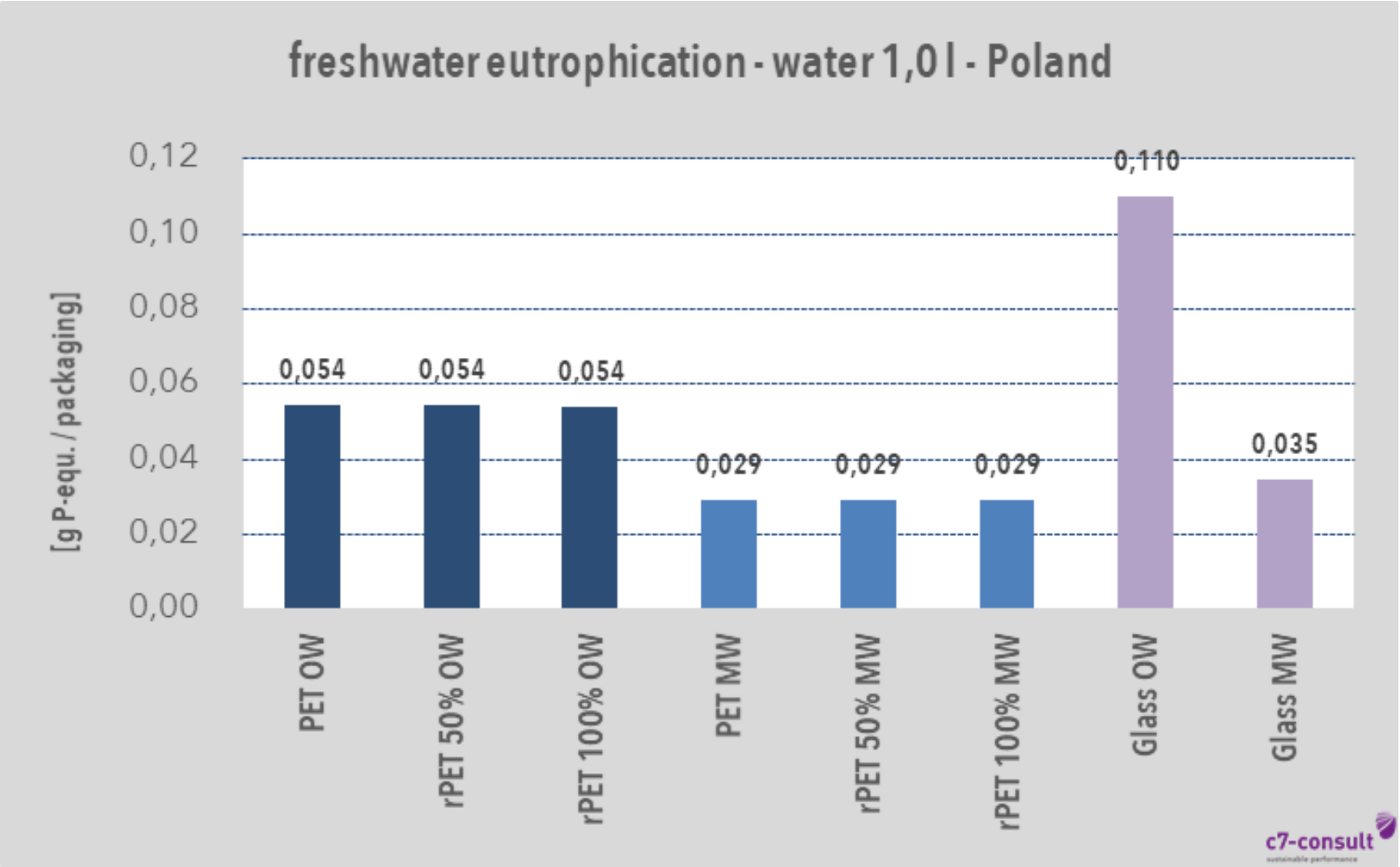
Water


acidification potential - water 1,0 l - Poland
[g SO2-equ./ packaging]
4,0
3,0
2,0
1,0
0,0
0,40
0,40
0,39
0,30
0,30
0,29
3,83
0,56
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

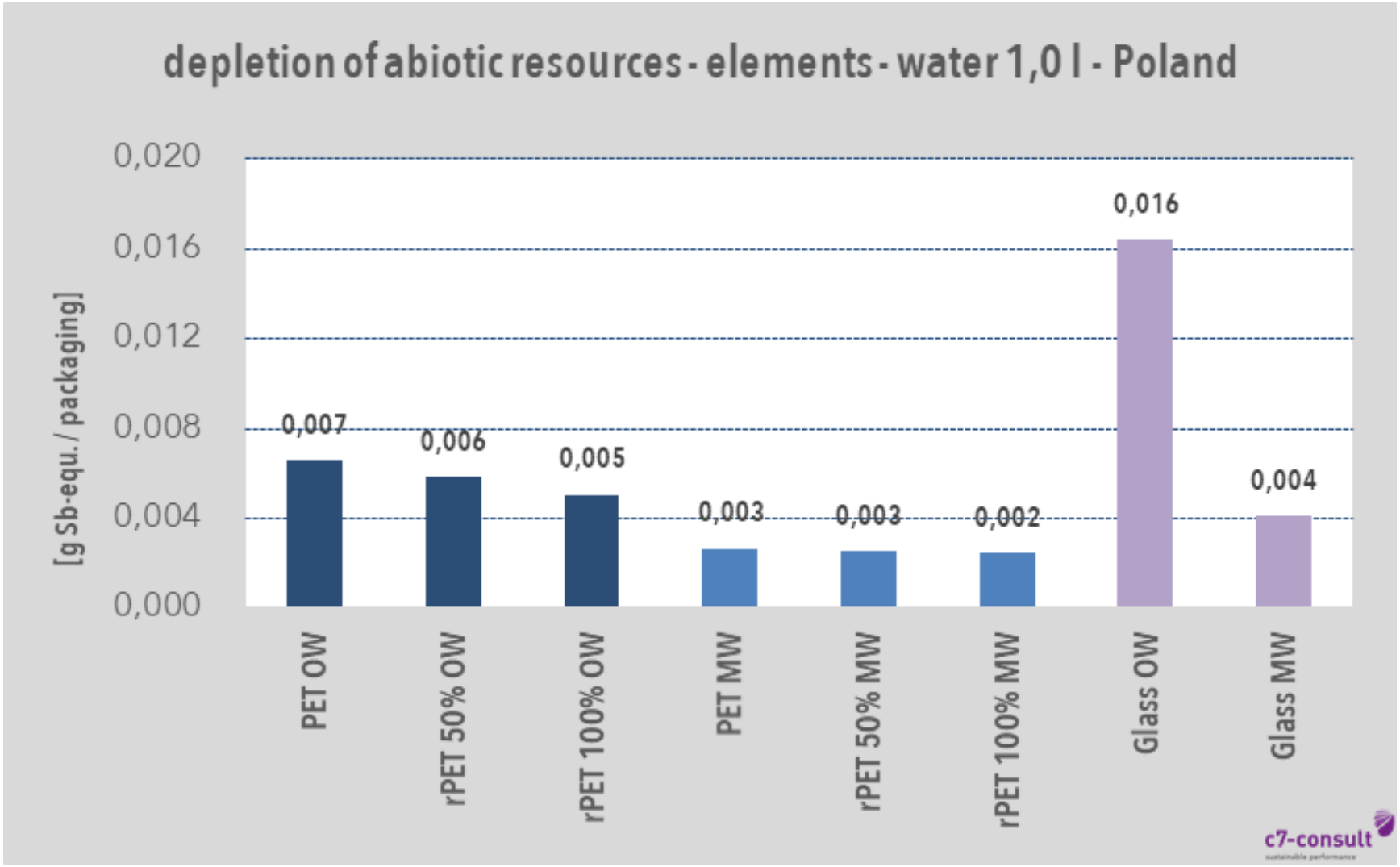
Water


photochemical oxidation (summer smog) - water 1,0 l - Poland
[mg ethene-equ. / packaging]
0,16
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,021
0,021
0,021
0,015
0,015
0,015
0,152
0,027
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

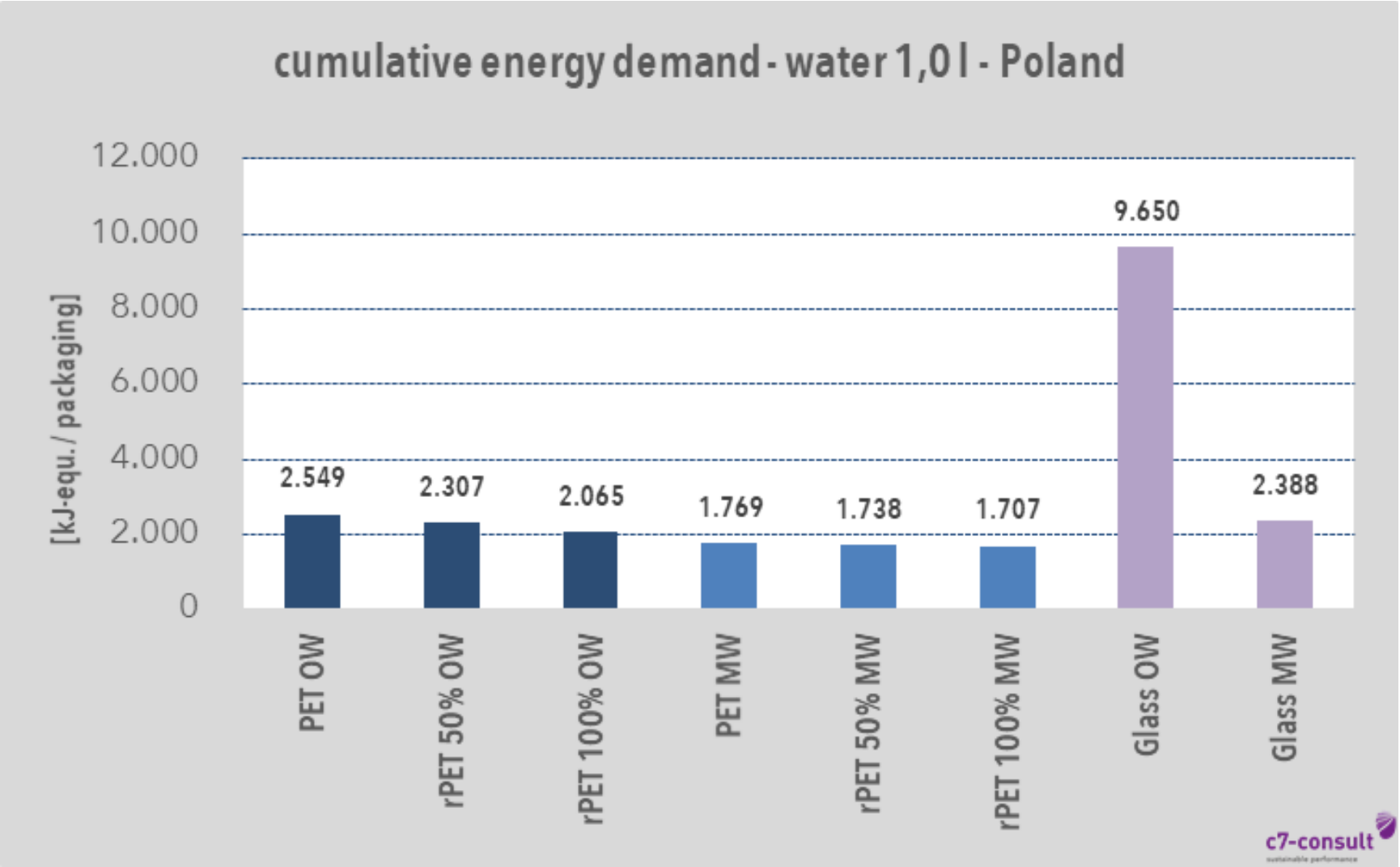
Water


freshwater eutrophication - water 1,0 l - Poland
[g P-equ. / packaging]
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,054
0,054
0,054
0,029
0,029
0,029
0,110
0,035
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

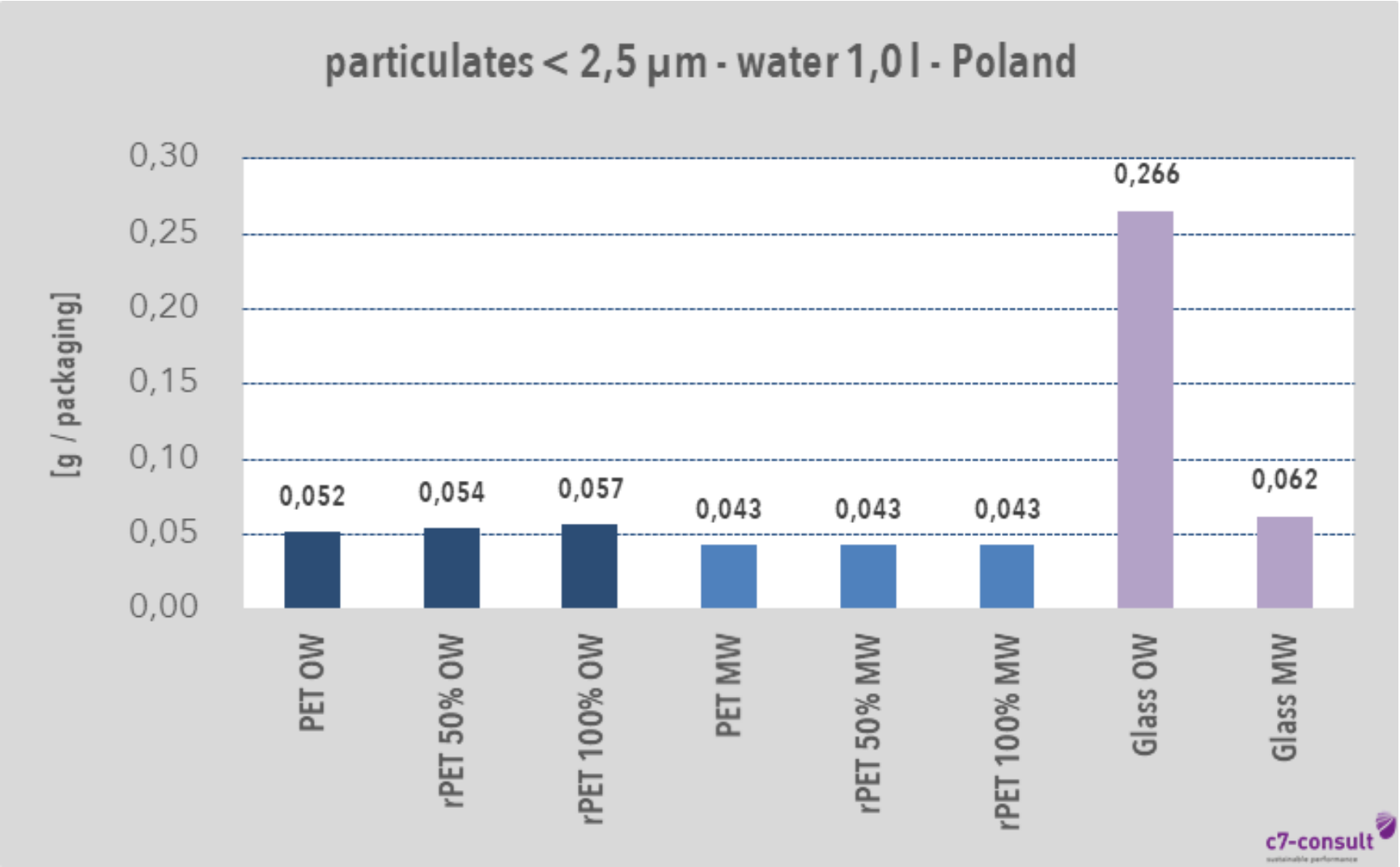
Water


depletion of abiotic resources - elements - water 1,0 l - Poland
[g Sb-equ. / packaging]
0,020
0,016
0,012
0,008
0,004
0,000
0,007
0,006
0,005
0,003
0,003
0,002
0,016
0,004
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

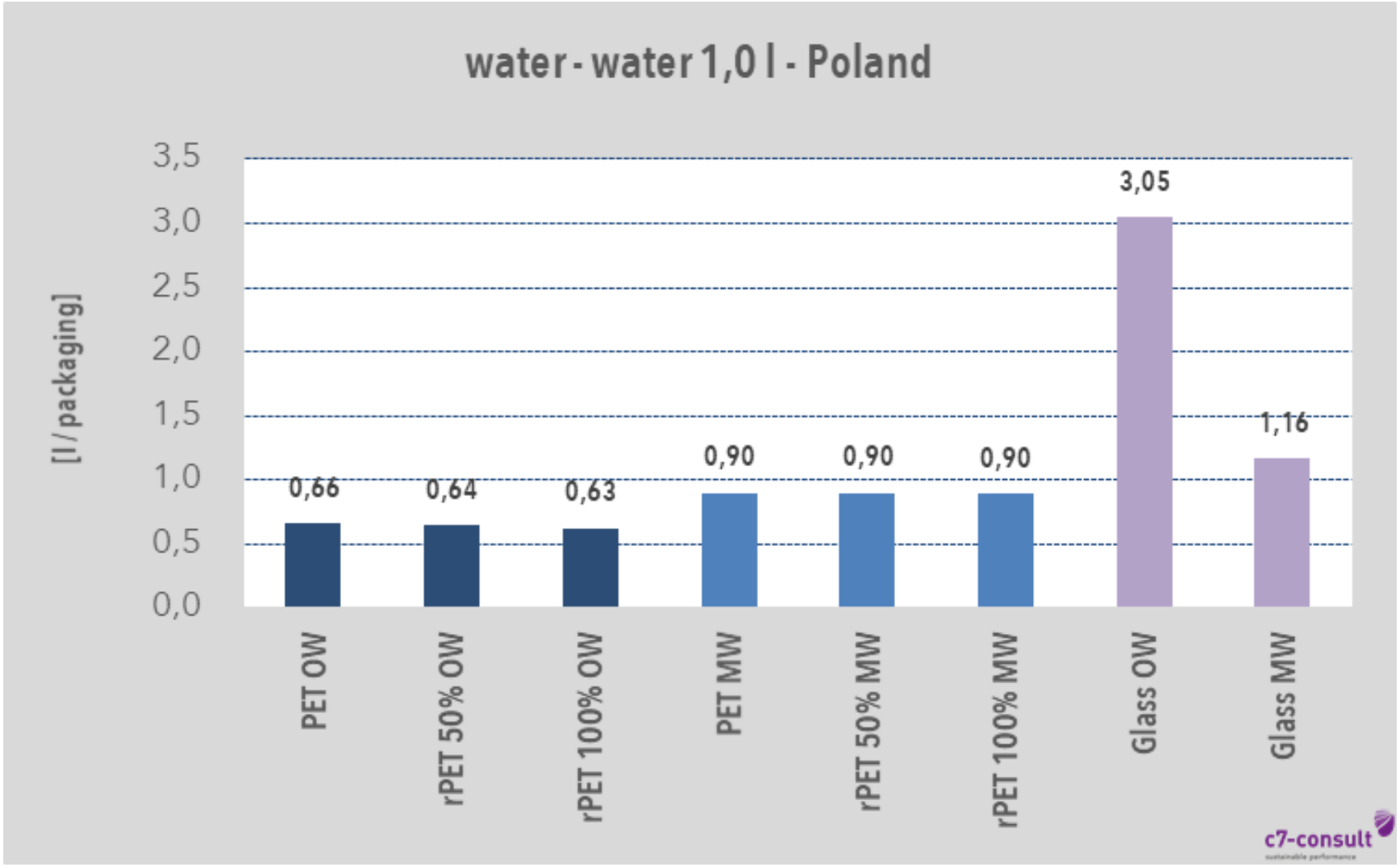
Water


cumulative energy demand - water 1,0 l - Poland
[kJ-equ./ packaging]
12.000
10.000
8.000
6.000
4.000
2.000
0
2.549
2.307
2.065
1.769
1.738
1.707
9.650
2.388
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

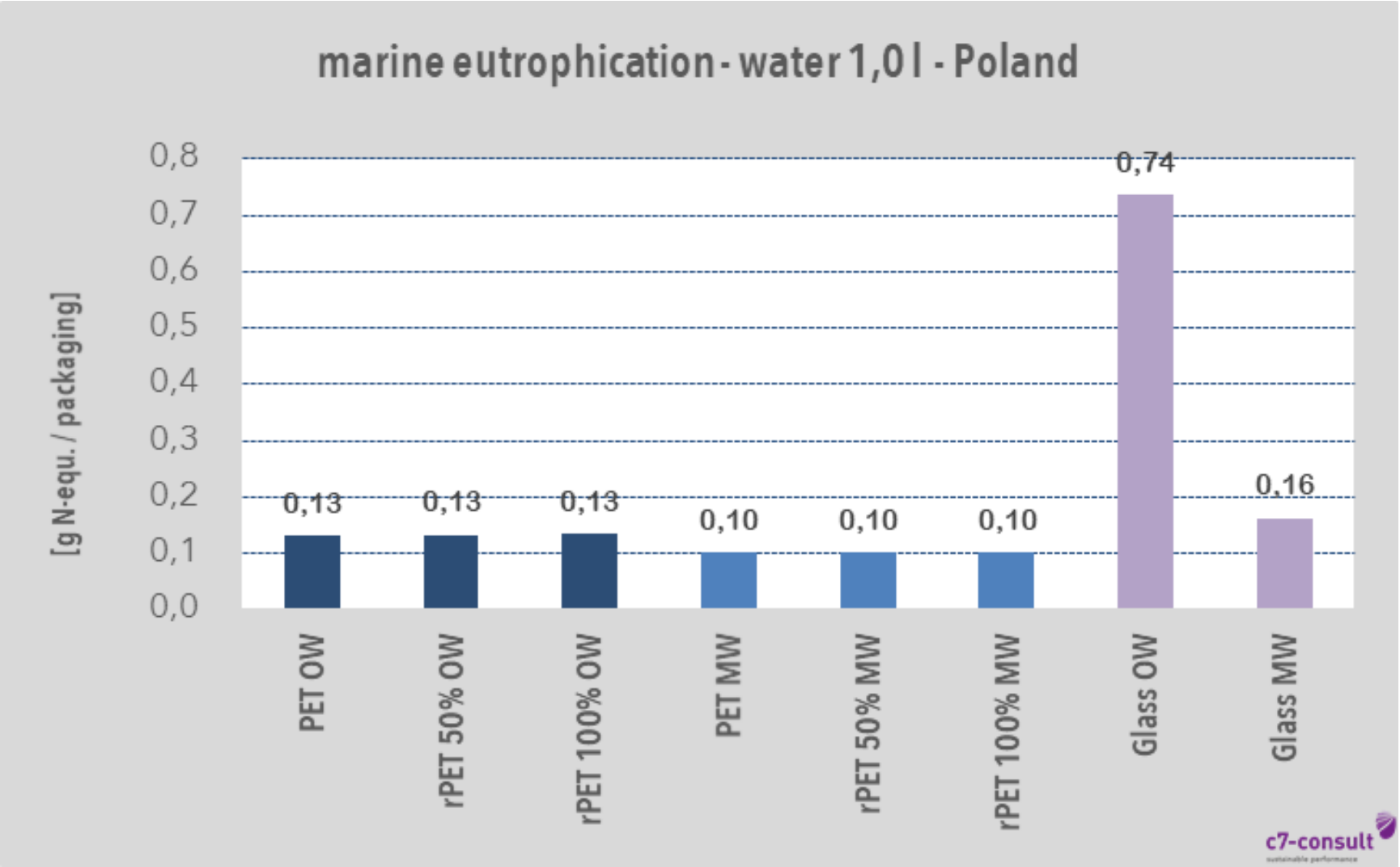
Water


particulates < 2,5 µm - water 1,0 l - Poland
[g / packaging]
0,30
0,25
0,20
0,15
0,10
0,05
0,00
0,052
0,054
0,057
0,043
0,043
0,043
0,266
0,062
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

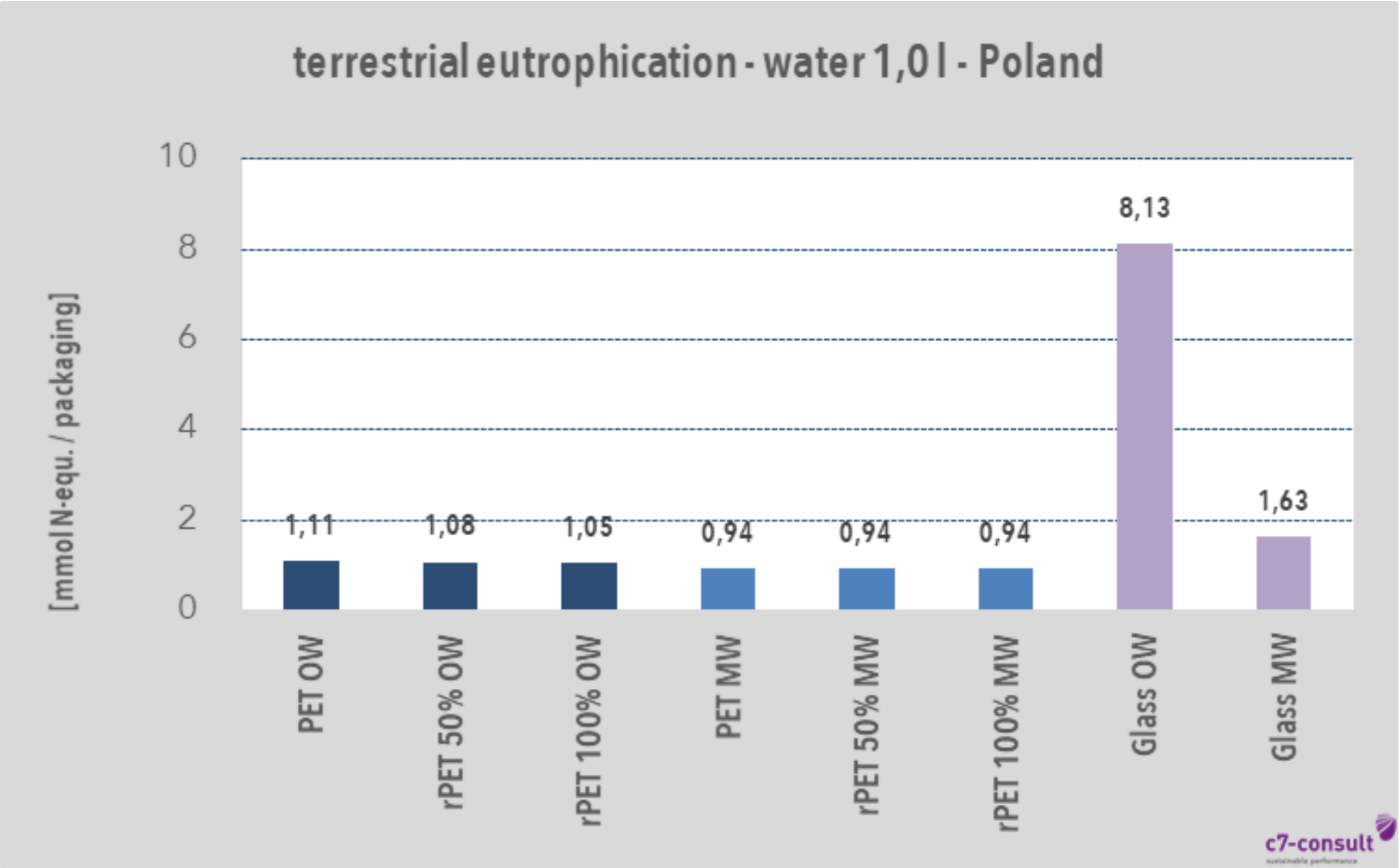
Water


water - water 1,0 l - Poland
[l / packaging]
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,66
0,64
0,63
0,90
0,90
0,90
3,05
1,16
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

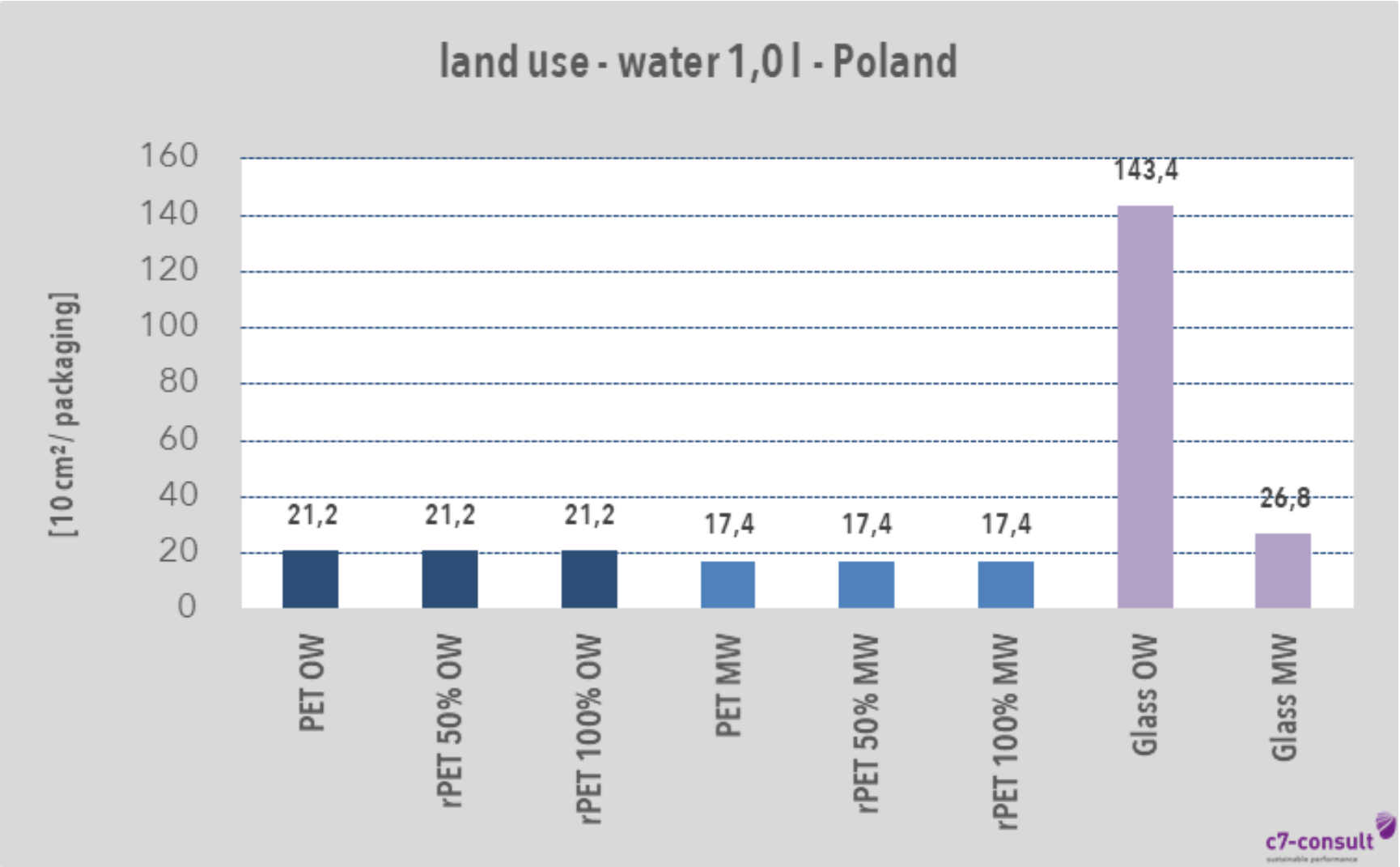
Water


marine eutrophication - water 1,0 l - Poland
[g N-equ. / packaging]
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,0
0,13
0,13
0,13
0,10
0,10
0,10
0,74
0,16
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

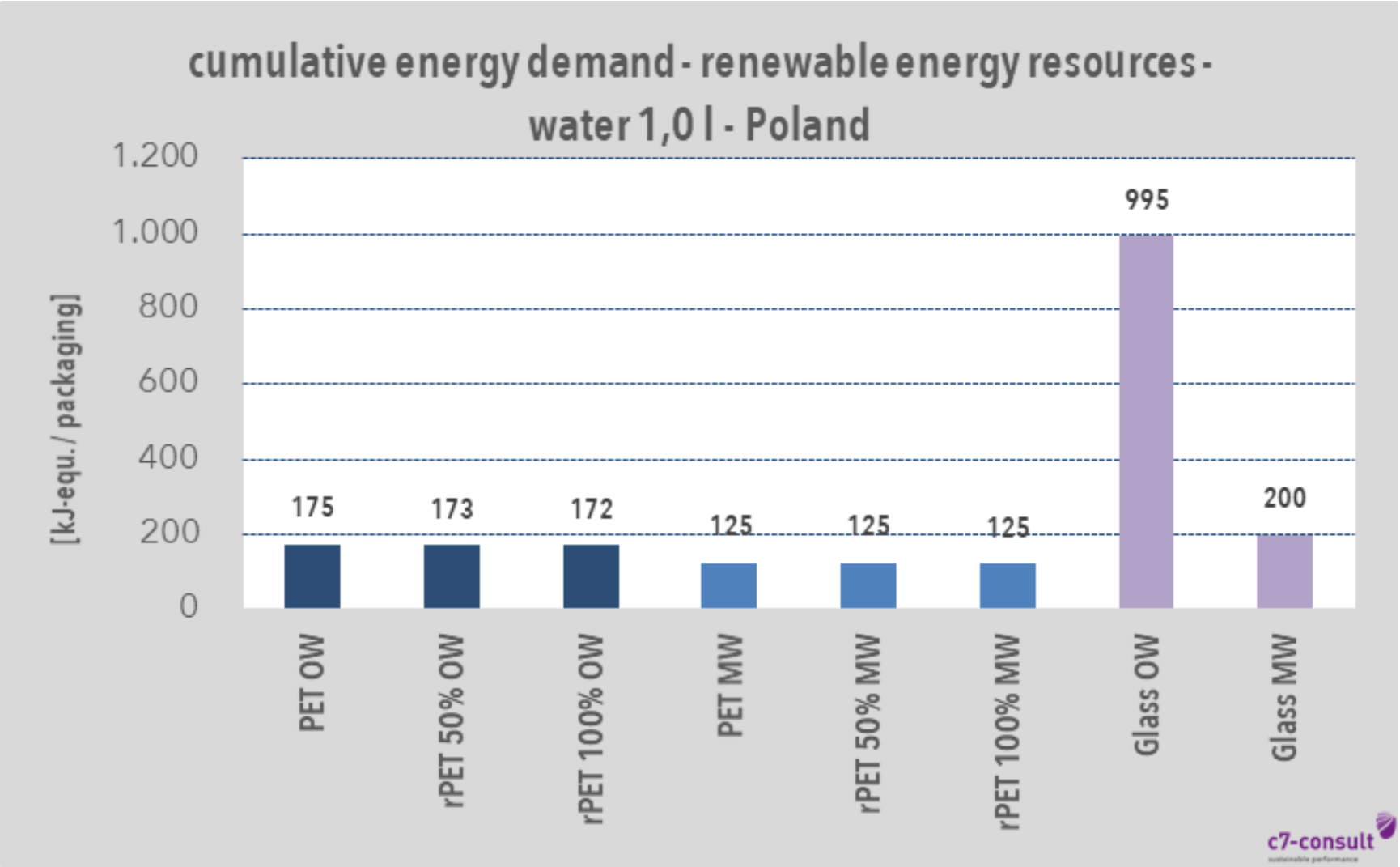
Water


terrestrial eutrophication - water 1,0 l - Poland
[mmol N-equ. / packaging]
10
8
6
4
2
0
1,11
1,08
1,05
0,94
0,94
0,94
8,13
1,63
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

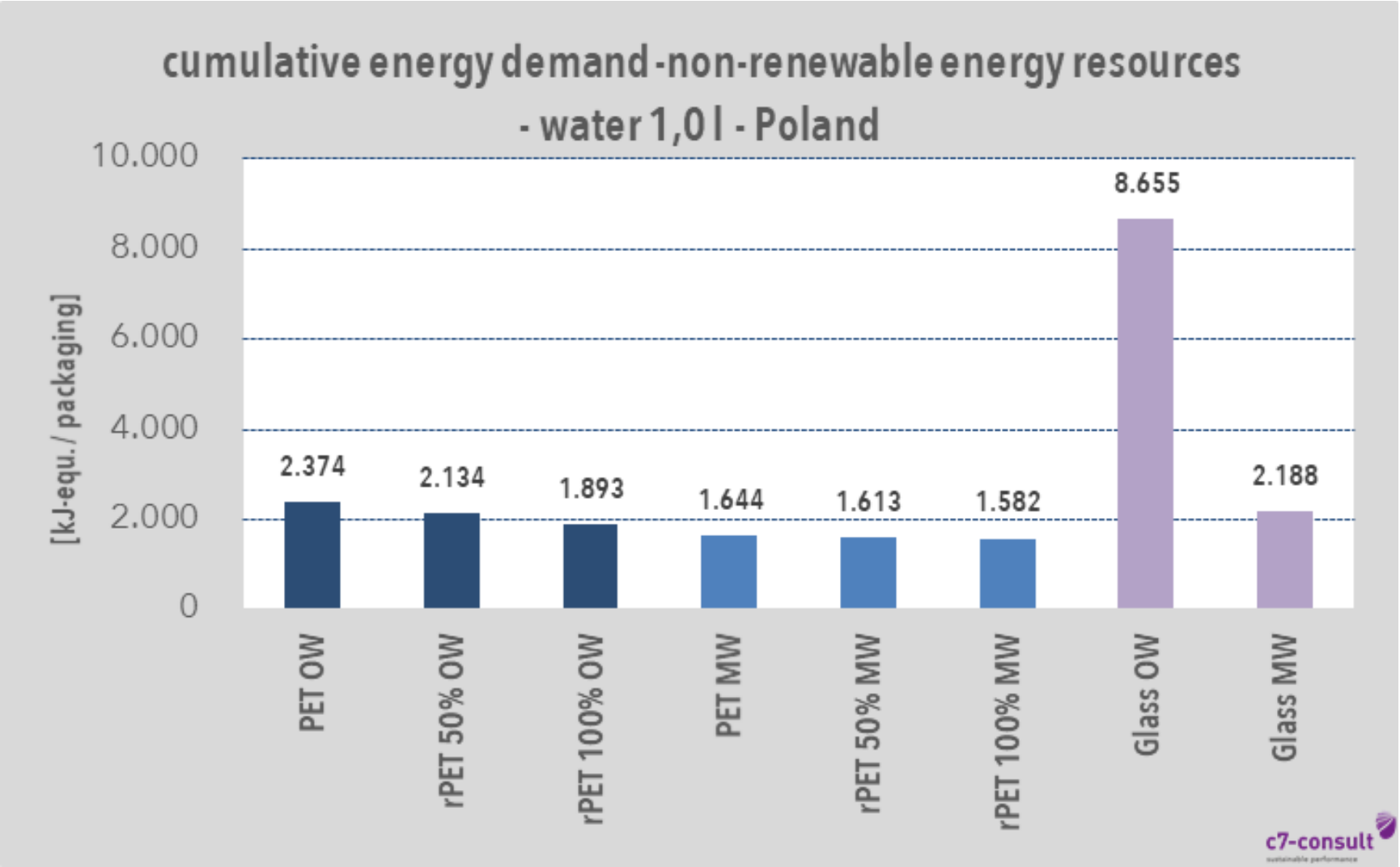
Water


land use - water 1,0 l - Poland
[10 cm² / packaging]
160
140
120
100
80
60
40
20
0
21,2
21,2
21,2
17,4
17,4
17,4
143,4
26,8
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

Water


cumulative energy demand - renewable energy resources - water 1,0 l - Poland
[kJ-equ./ packaging]
1.200
1.000
800
600
400
200
0
175
173
172
125
125
125
995
200
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

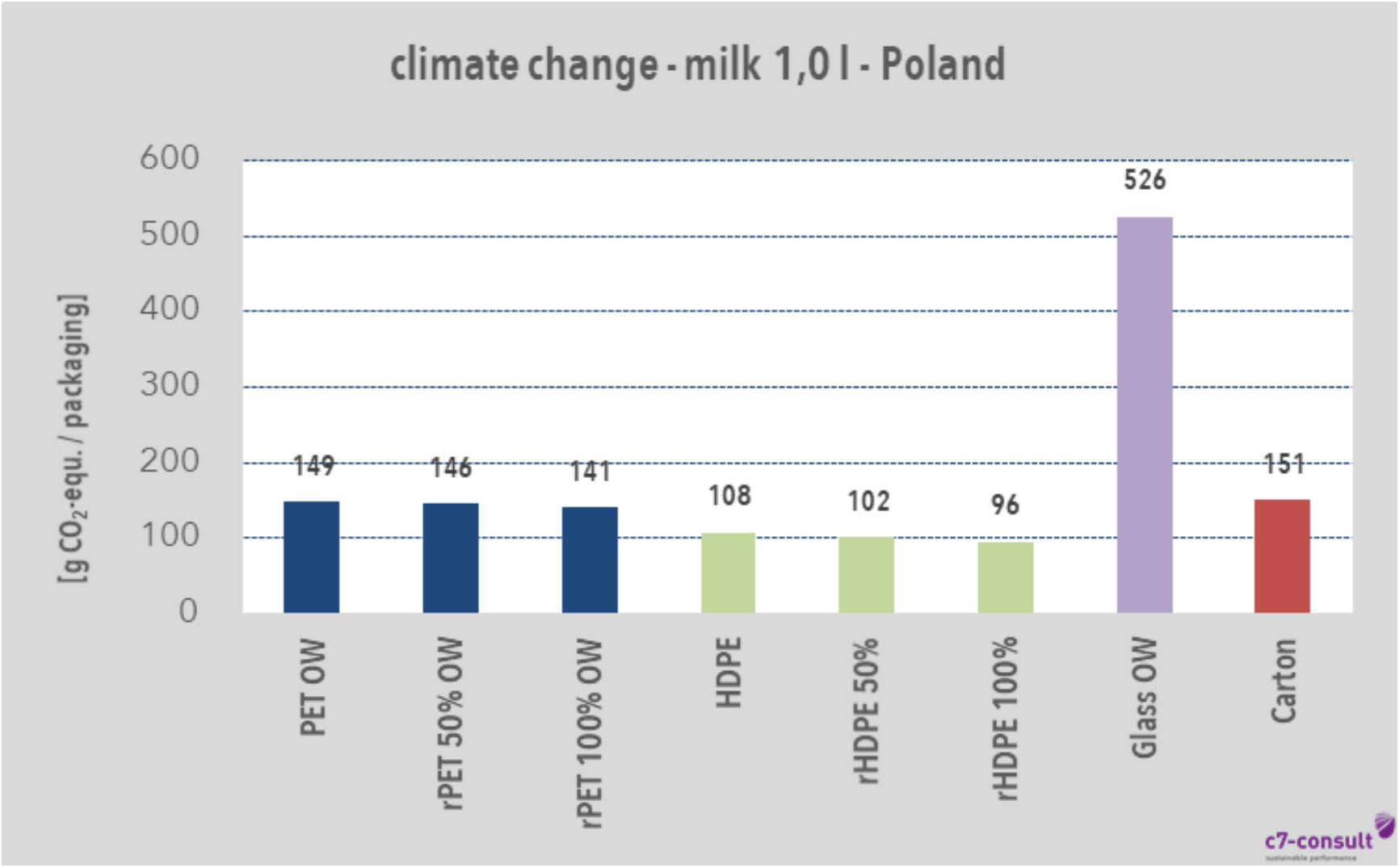
Water


cumulative energy demand -non-renewable energy resources
- water 1,0 l - Poland
[kJ-equ./ packaging]
10.000
8.000
6.000
4.000
2.000
0
2.374
2.134
1.893
1.644
1.613
1.582
8.655
2.188
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
c7-consult

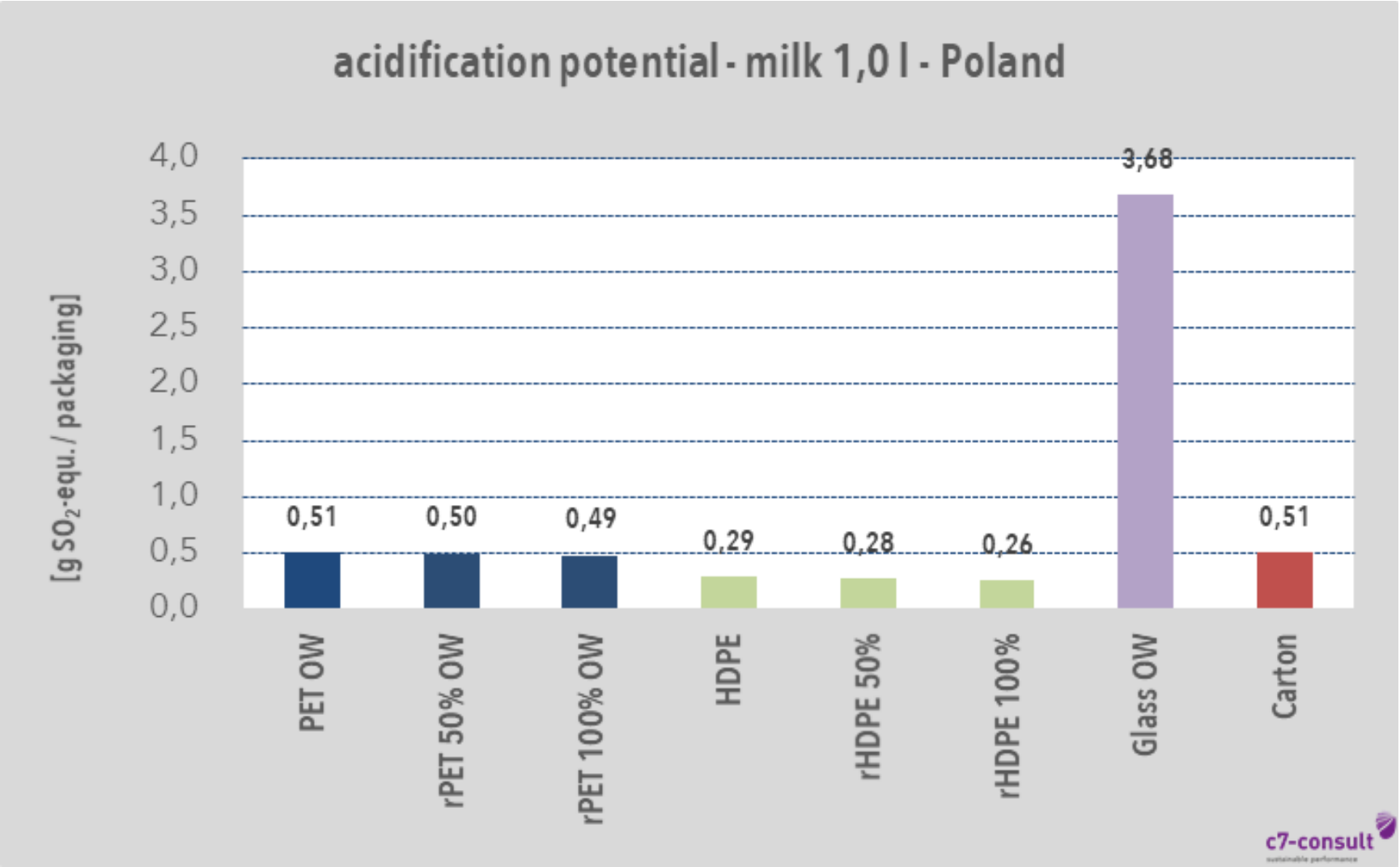
c7-consult
sustainable performance

Results Milk 1,0 l

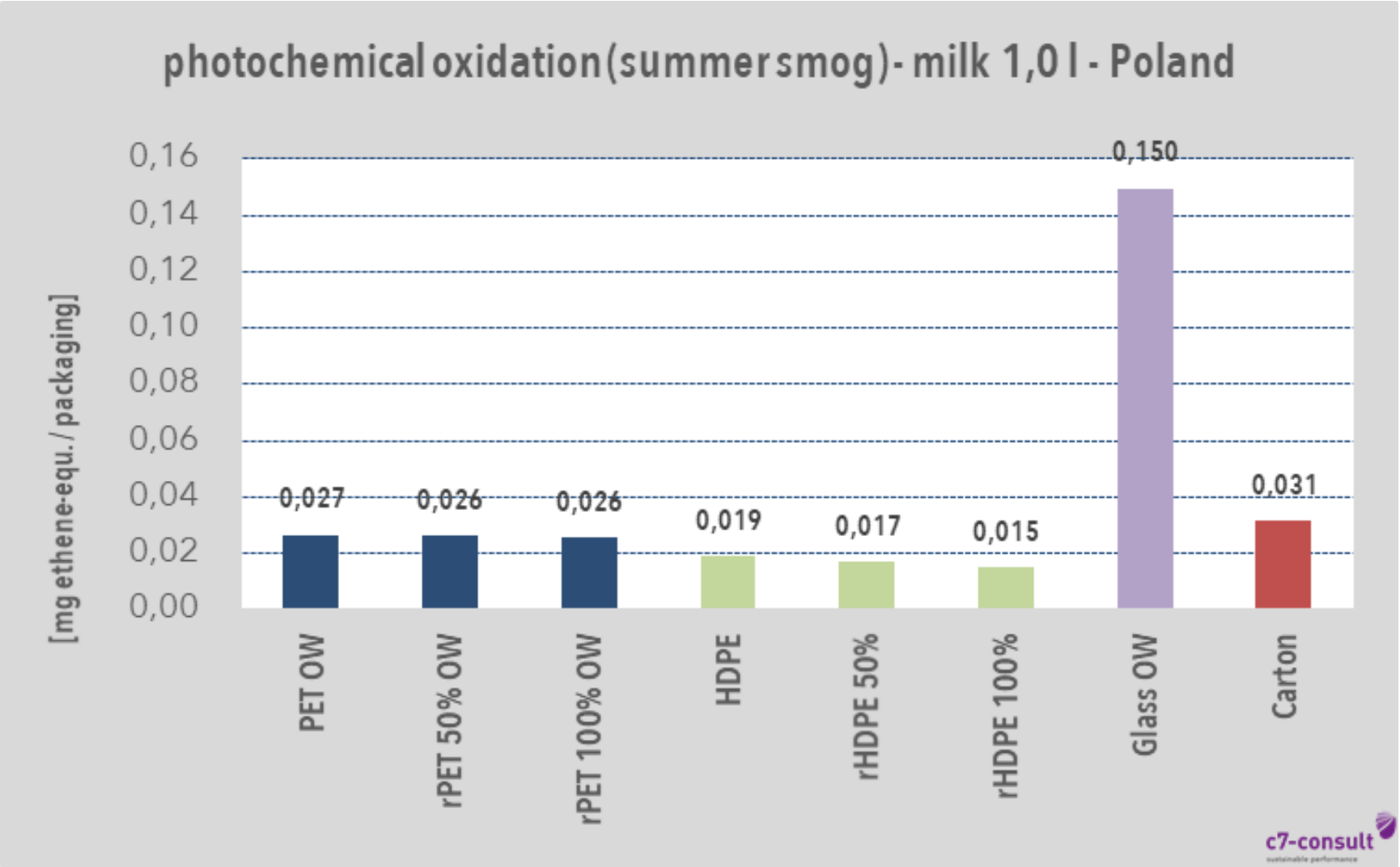
Milk


climate change - milk 1,0 l - Poland
[g CO_2-equ. / packaging]
600
500
400
300
200
100
0
149
146
141
108
102
96
526
151
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

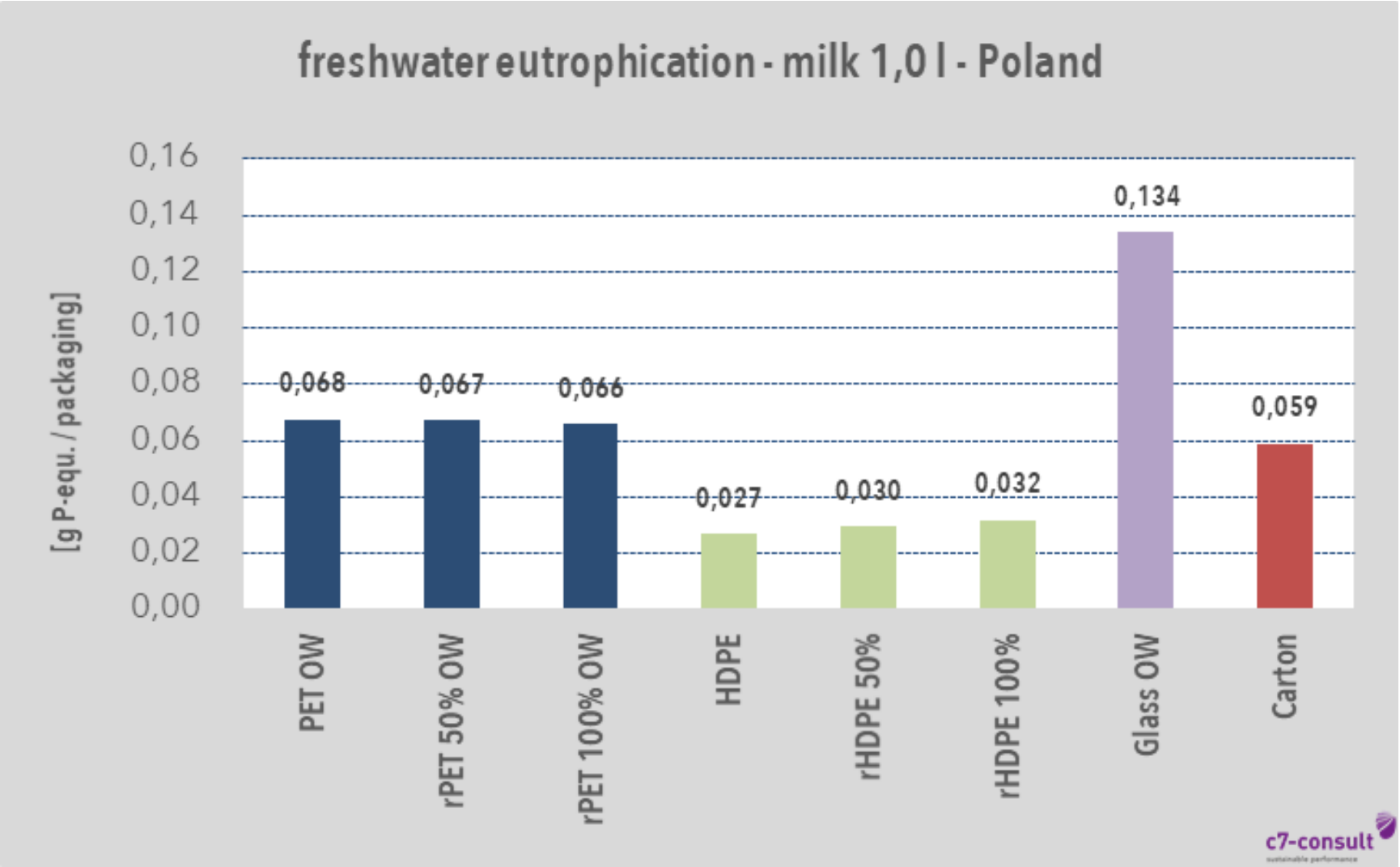
Milk


acidification potential - milk 1,0 l - Poland
[g SO2-equ./ packaging]
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,51
0,50
0,49
0,29
0,28
0,26
3,68
0,51
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

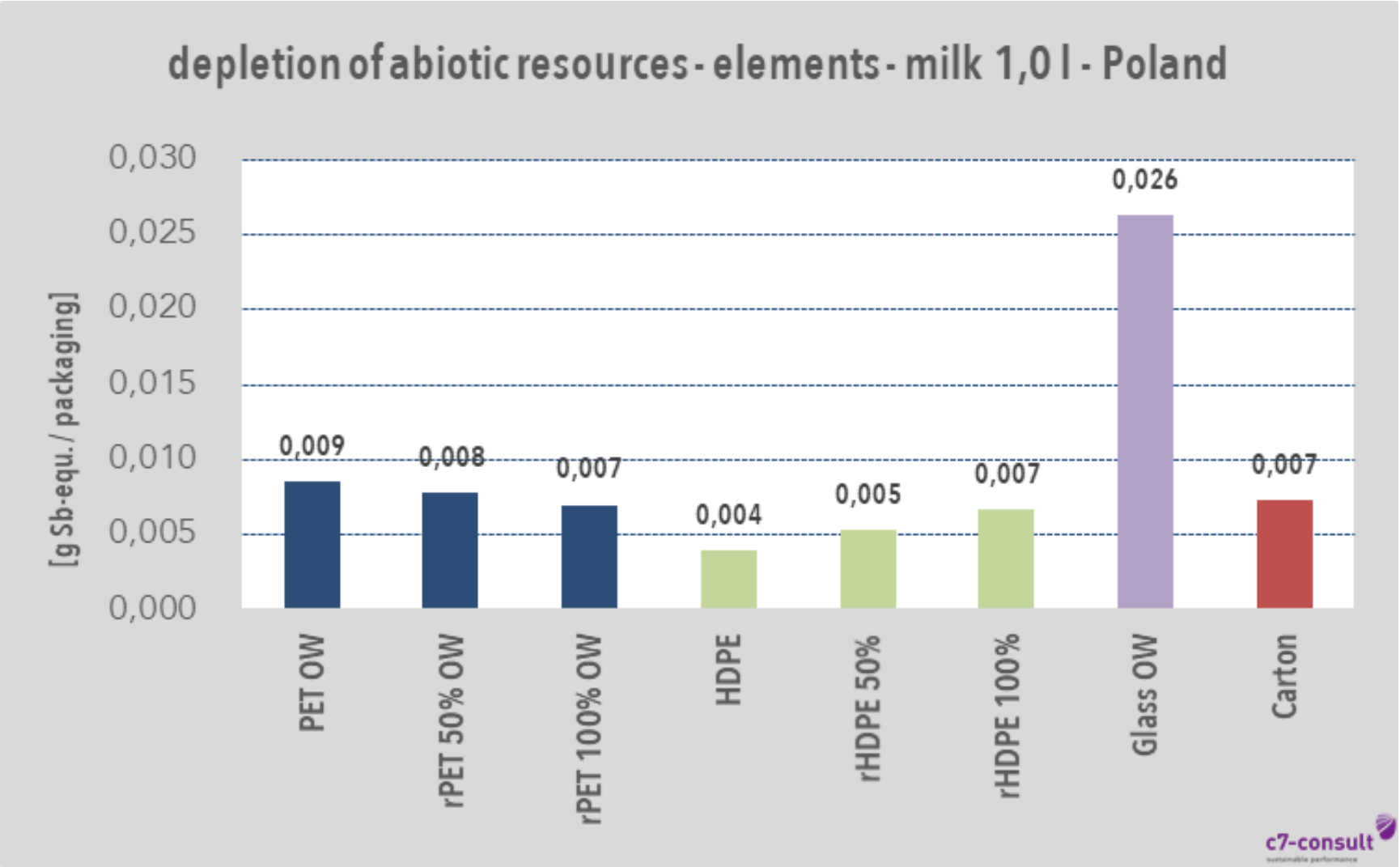
Milk


photochemical oxidation (summer smog) - milk 1,0 l - Poland
[mg ethene-equ. / packaging]
0,16
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,027
0,026
0,026
0,019
0,017
0,015
0,150
0,031
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

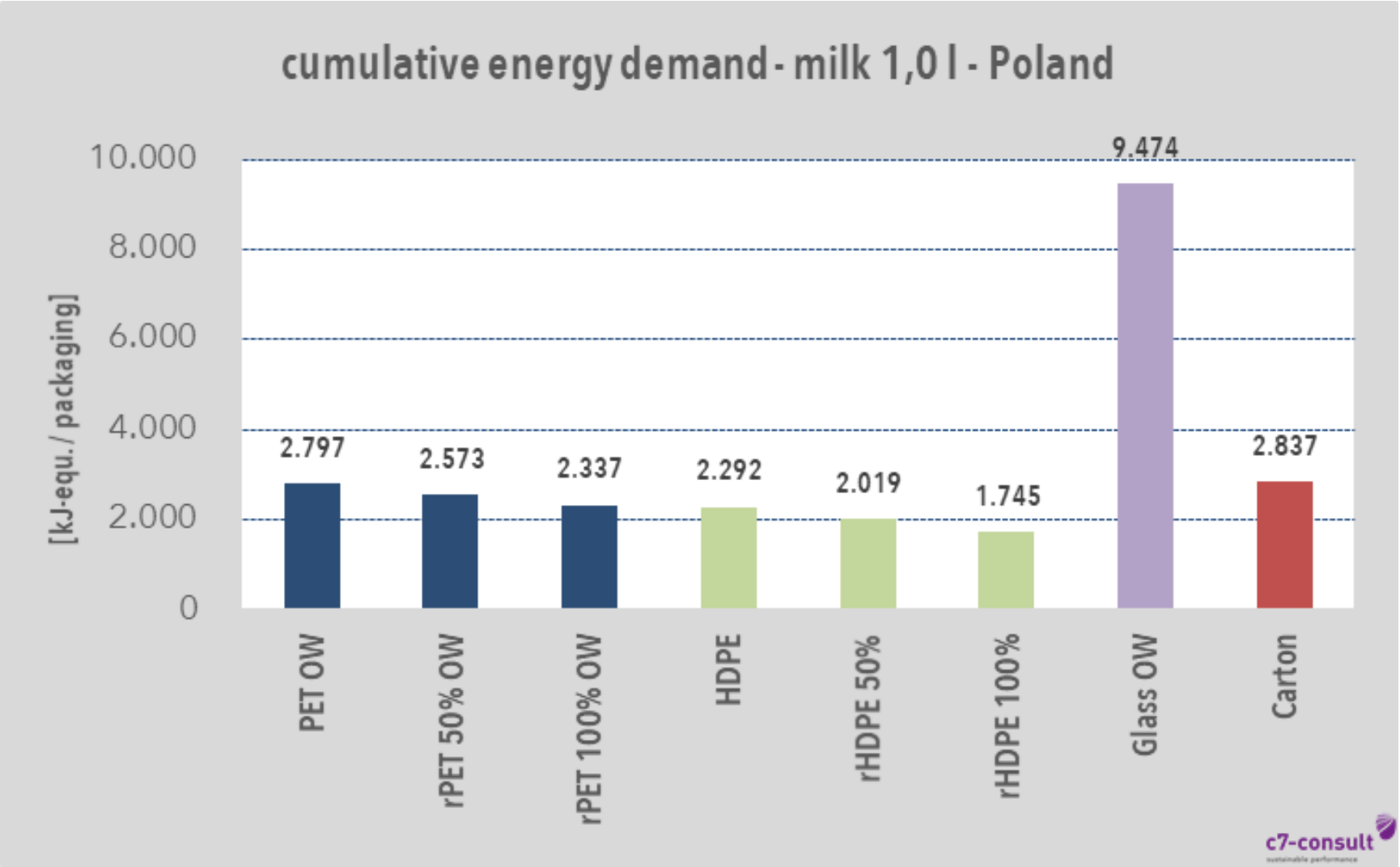
Milk


freshwater eutrophication - milk 1,0 l - Poland
[g P-equ. / packaging]
0,16
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,068
0,067
0,066
0,027
0,030
0,032
0,134
0,059
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

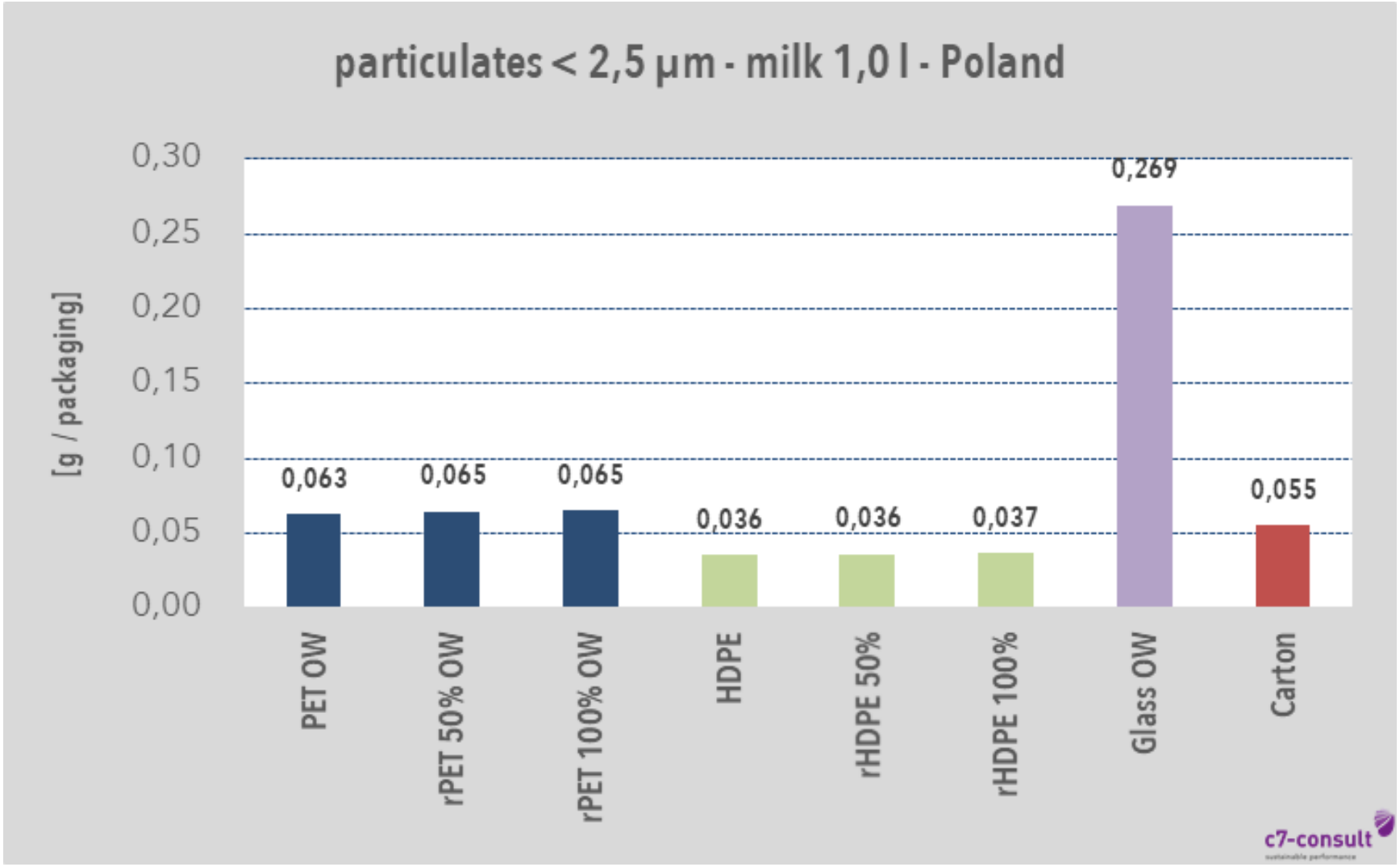
Milk


depletion of abiotic resources - elements - milk 1,0 l - Poland
[g Sb-equ. / packaging]
0,030
0,025
0,020
0,015
0,010
0,005
0,000
0,009
0,008
0,007
0,004
0,005
0,007
0,026
0,007
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

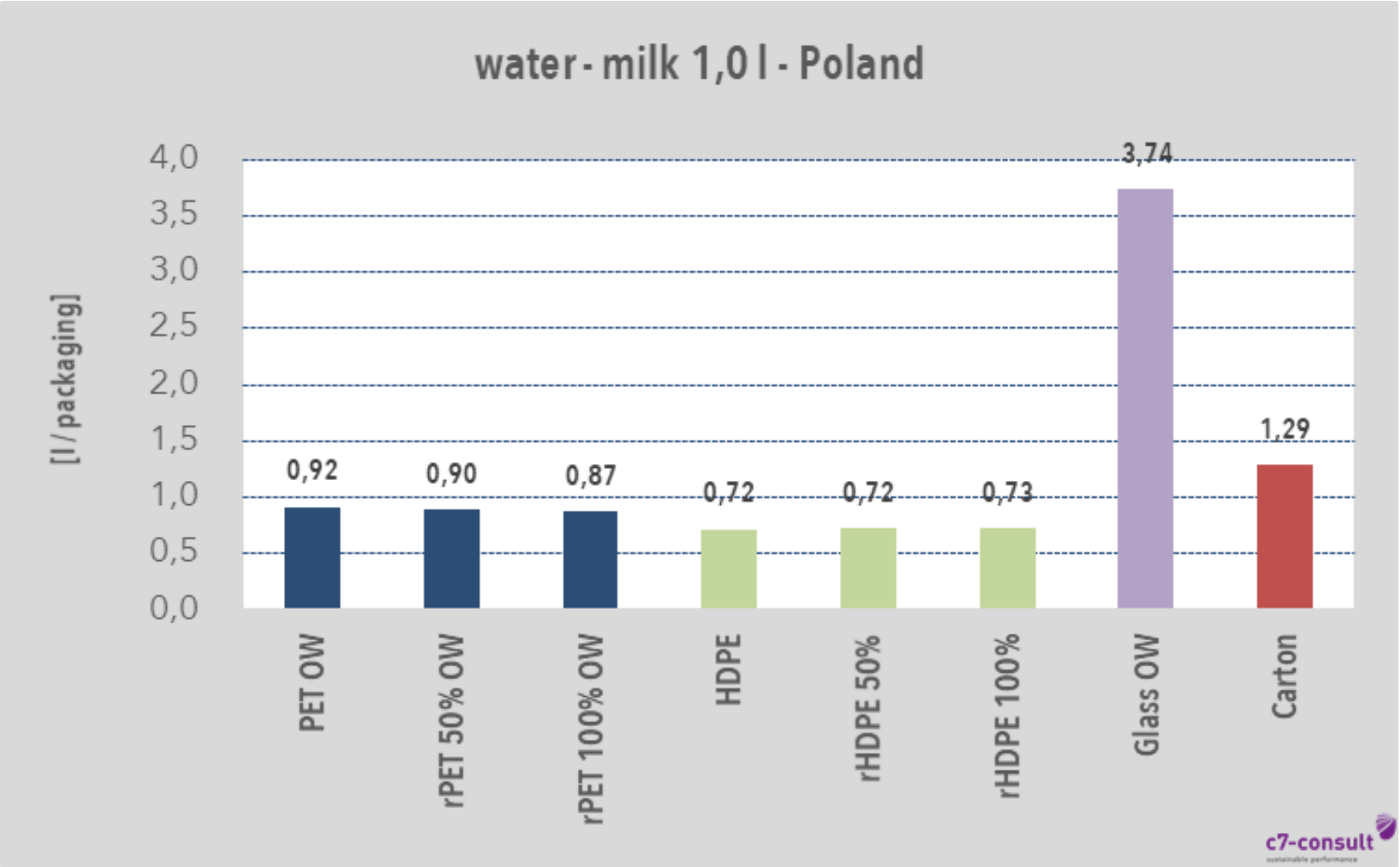
Milk


cumulative energy demand - milk 1,0 l - Poland
[kJ-equ./ packaging]
10.000
8.000
6.000
4.000
2.000
0
2.797
2.573
2.337
2.292
2.019
1.745
9.474
2.837
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

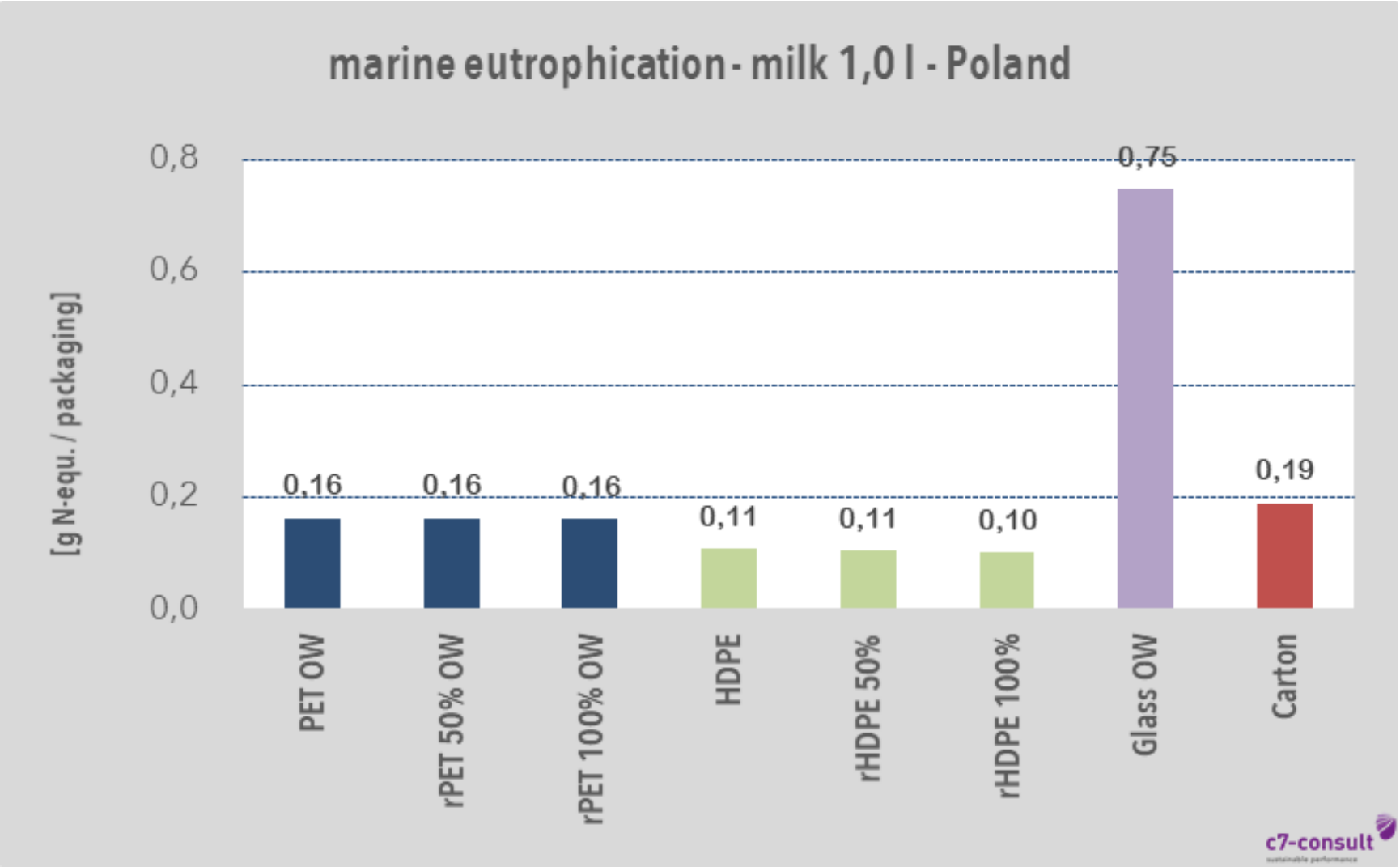
Milk


particulates < 2,5 µm - milk 1,0 l - Poland
[g / packaging]
0,30
0,25
0,20
0,15
0,10
0,05
0,00
0,063
0,065
0,065
0,036
0,036
0,037
0,269
0,055
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

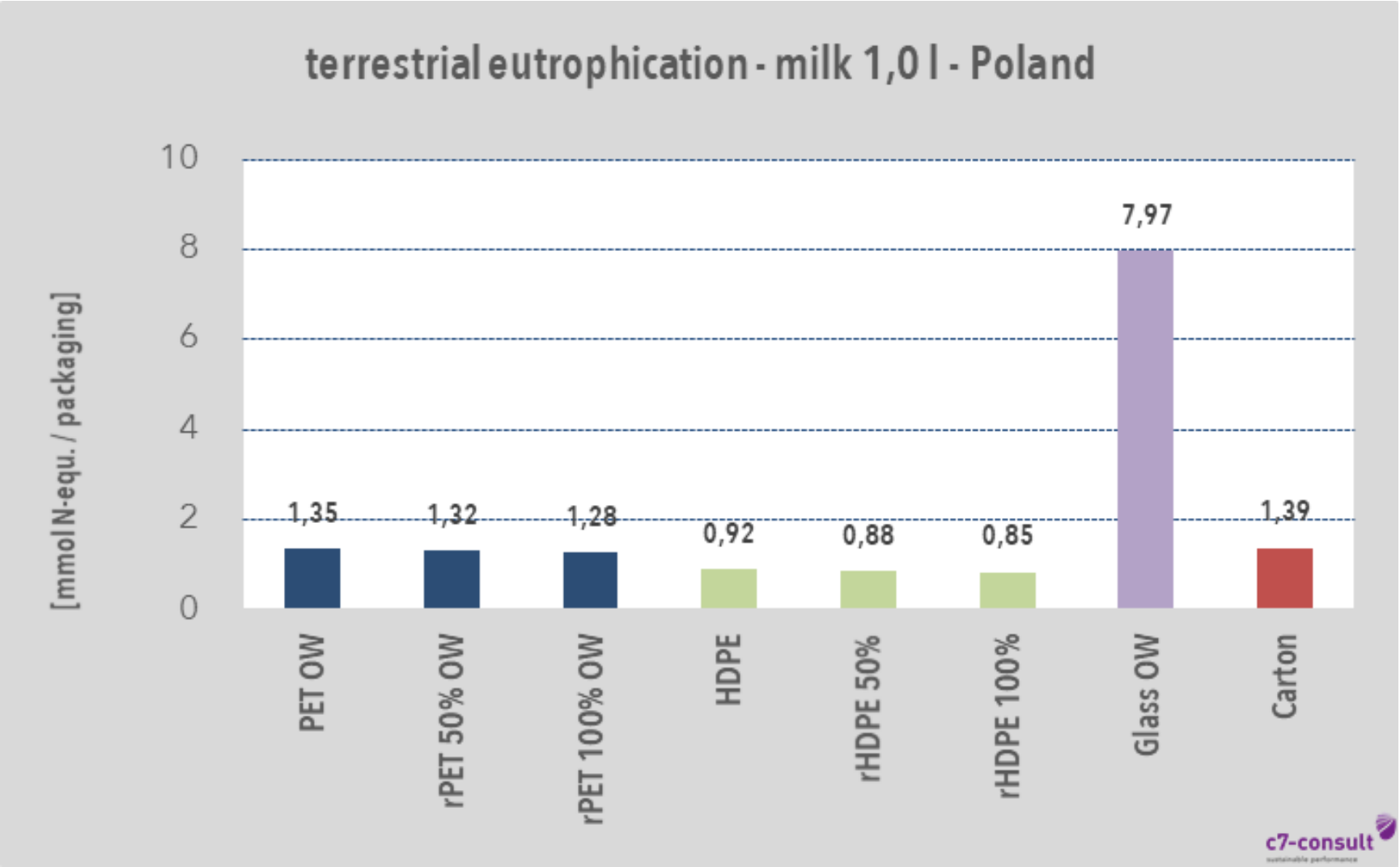
Milk


water - milk 1,0 l - Poland
[l / packaging]
4,0
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,92
0,90
0,87
0,72
0,72
0,73
3,74
1,29
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

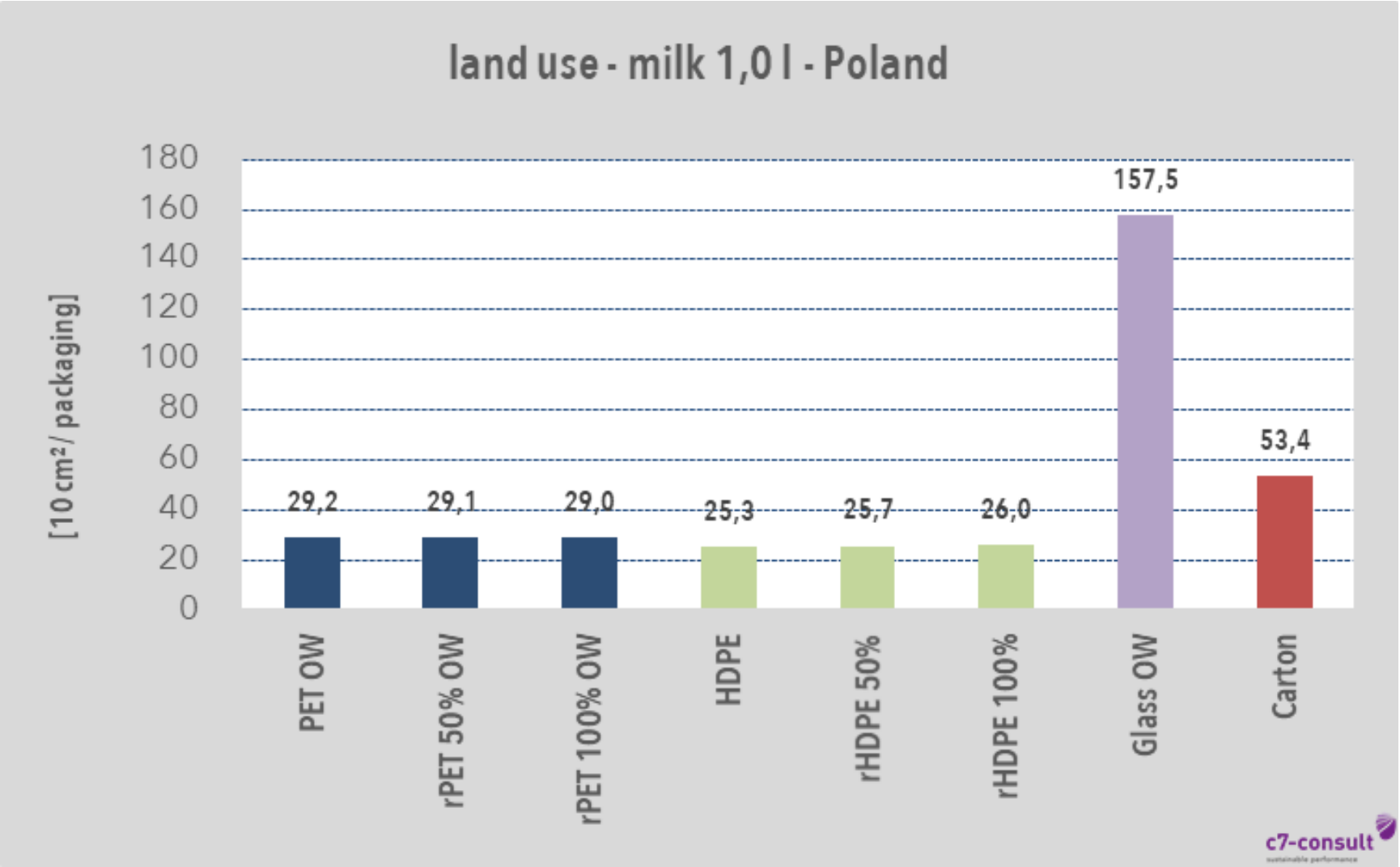
Milk


marine eutrophication - milk 1,0 l - Poland
[g N-equ. / packaging]
0,8
0,6
0,4
0,2
0,0
0,16
0,16
0,16
0,11
0,11
0,10
0,75
0,19
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

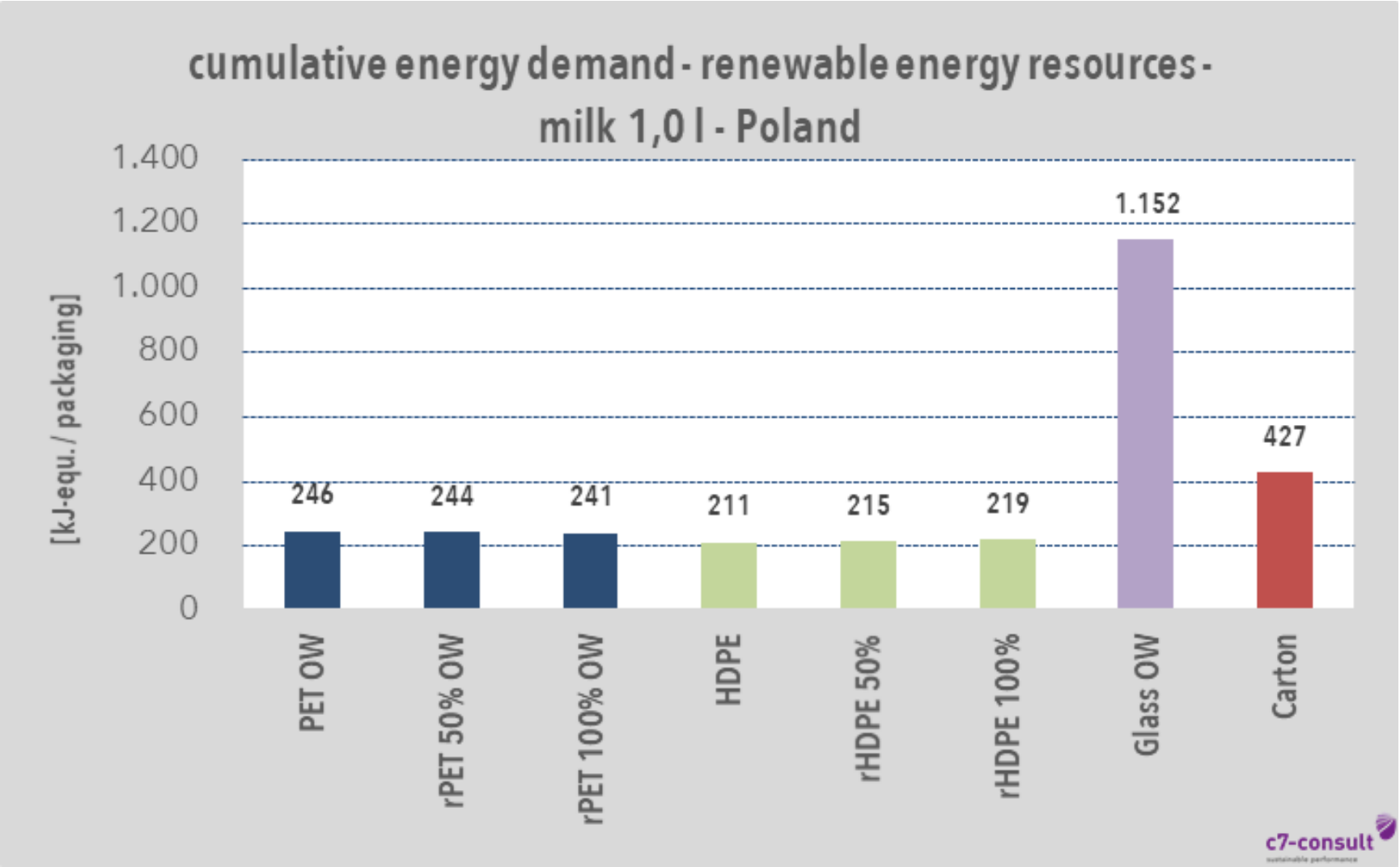
Milk


terrestrial eutrophication - milk 1,0 l - Poland
[mmol N-equ. / packaging]
10
8
6
4
2
0
1,35
1,32
1,28
0,92
0,88
0,85
7,97
1,39
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

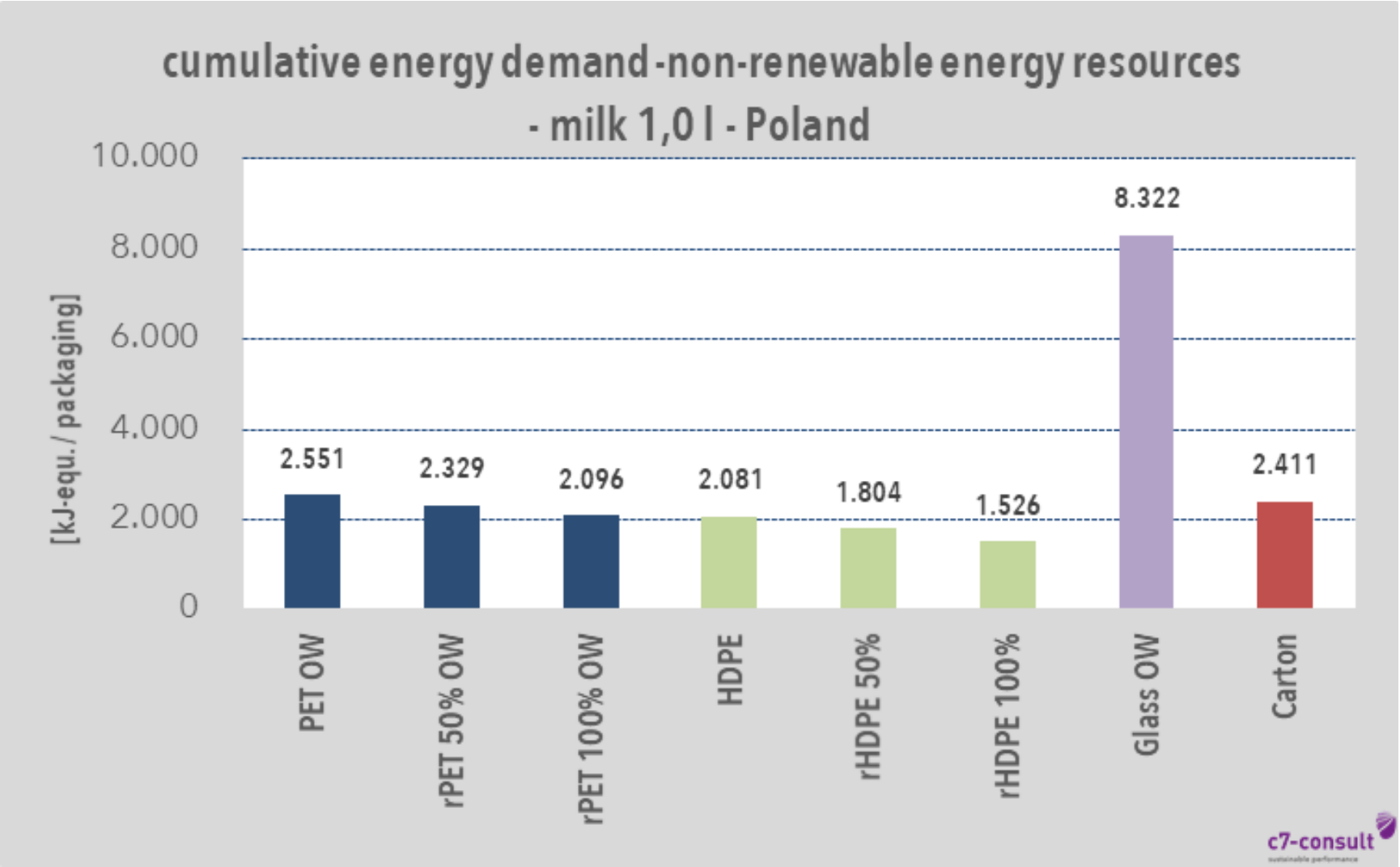
Milk


land use - milk 1,0 l - Poland
[10 cm² / packaging]
180
160
140
120
100
80
60
40
20
0
29,2
29,1
29,0
25,3
25,7
26,0
157,5
53,4
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

Milk


cumulative energy demand - renewable energy resources -
milk 1,0 l - Poland
[kJ-equ./ packaging]
1.400
1.200
1.000
800
600
400
200
0
246
244
241
211
215
219
1.152
427
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

Milk


cumulative energy demand -non-renewable energy resources
- milk 1,0 l - Poland
[kJ-equ./ packaging]
10.000
8.000
6.000
4.000
2.000
0
2.551
2.329
2.096
2.081
1.804
1.526
8.322
2.411
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
Glass OW
Carton
c7-consult

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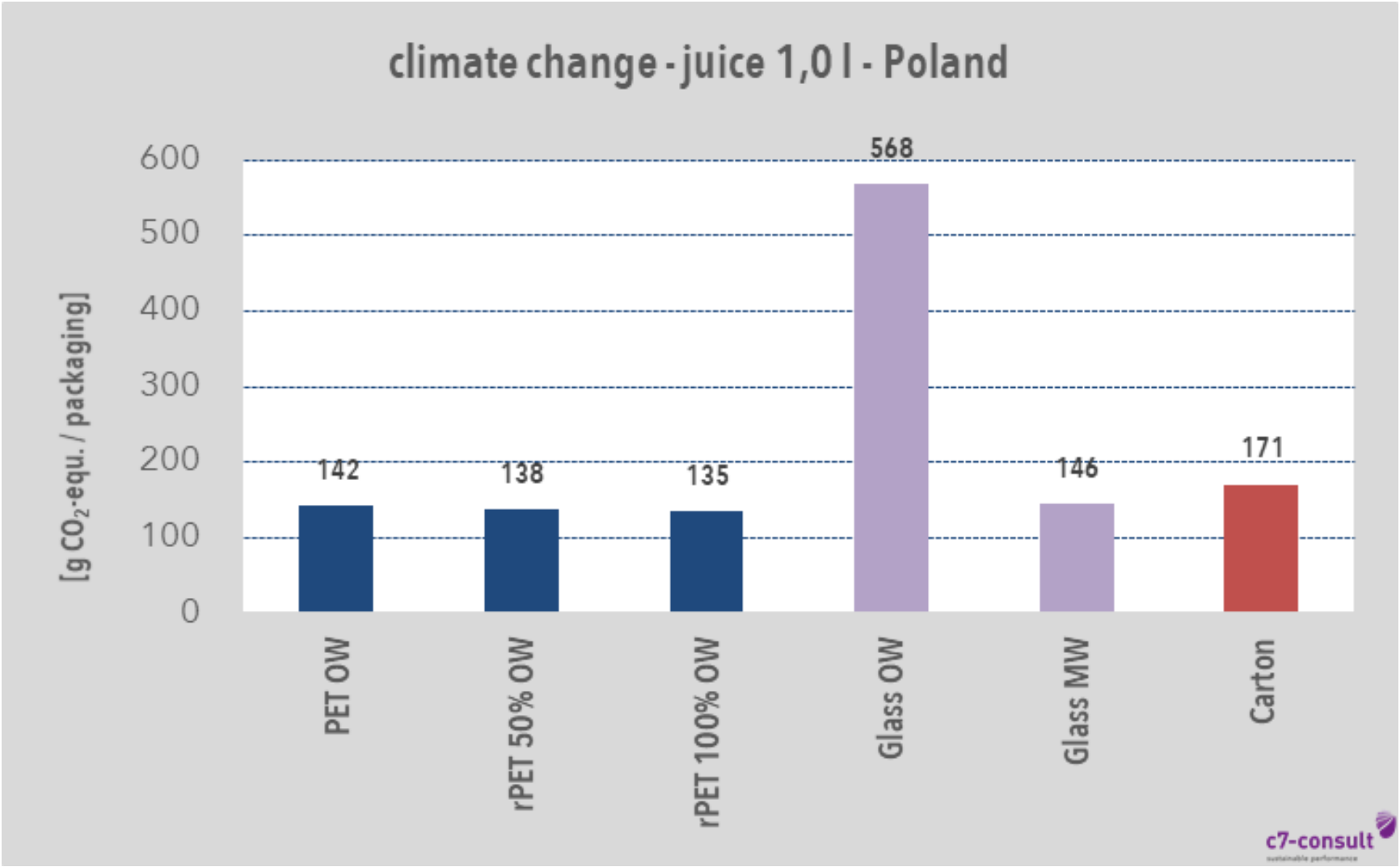
sustainable performance

Results Juice 1,0 l

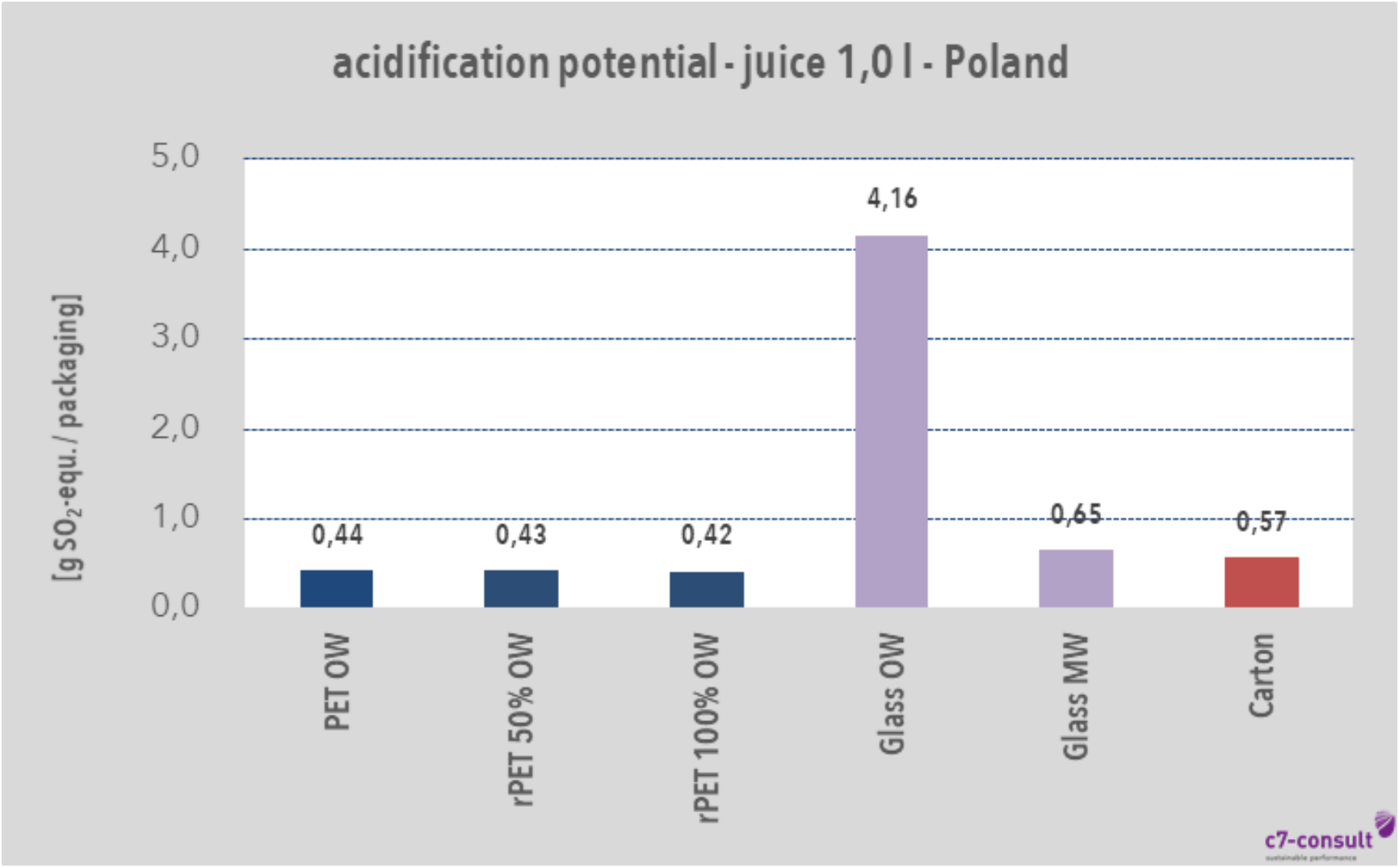
c7-consult e.U. A-2453 Sommerein, Lindau 21 T +43 2168 62 861 E office@c7-consult.at W www.c7-consult.at

MEMBER OF TEAM ZF

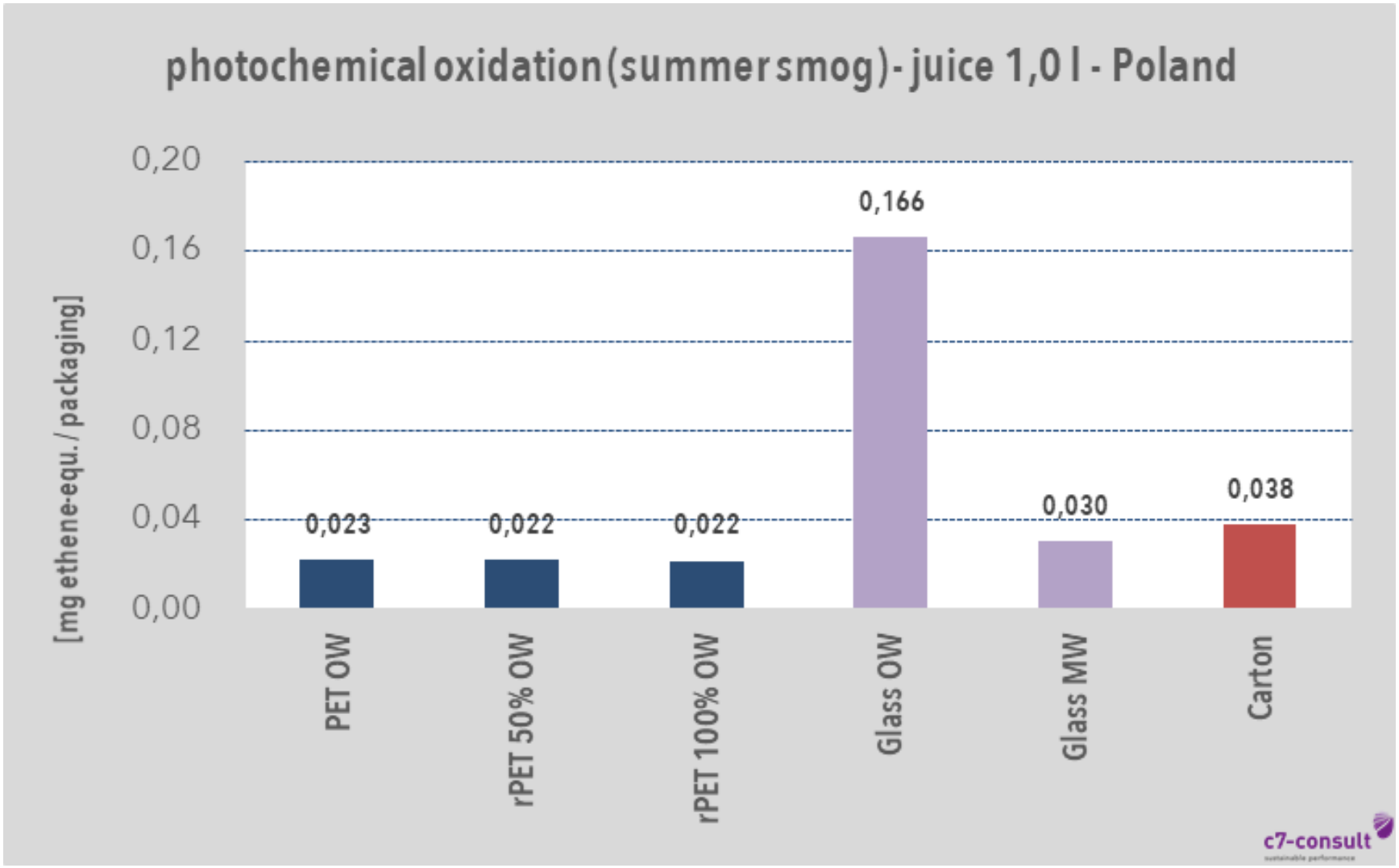
Juice


climate change - juice 1,0 l - Poland
[g CO2-equ. / packaging]
600
500
400
300
200
100
0
142
138
135
568
146
171
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

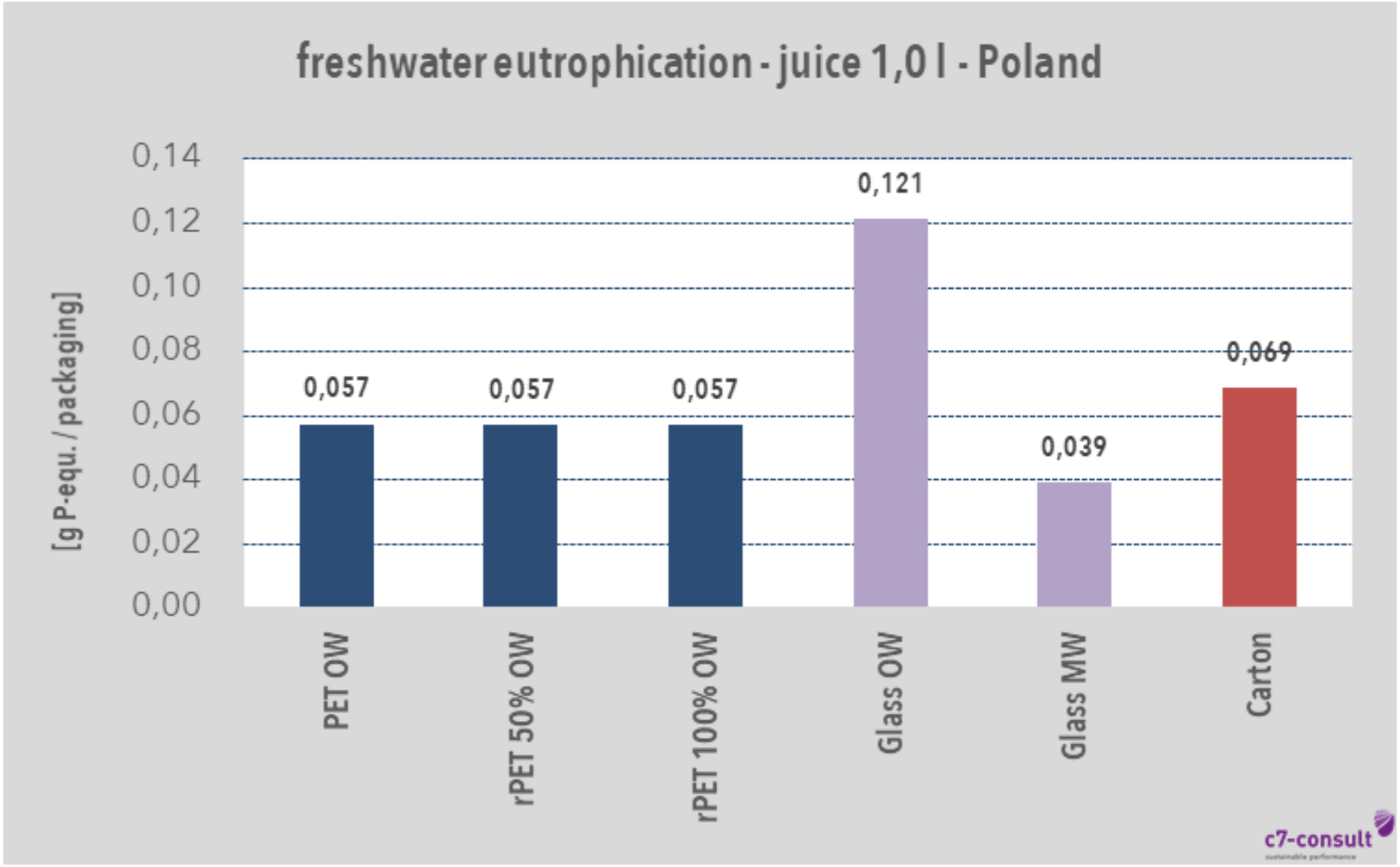
Juice


acidification potential - juice 1,0 l - Poland
[g SO2-equ./ packaging]
5,0
4,0
3,0
2,0
1,0
0,0
0,44
0,43
0,42
4,16
0,65
0,57
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

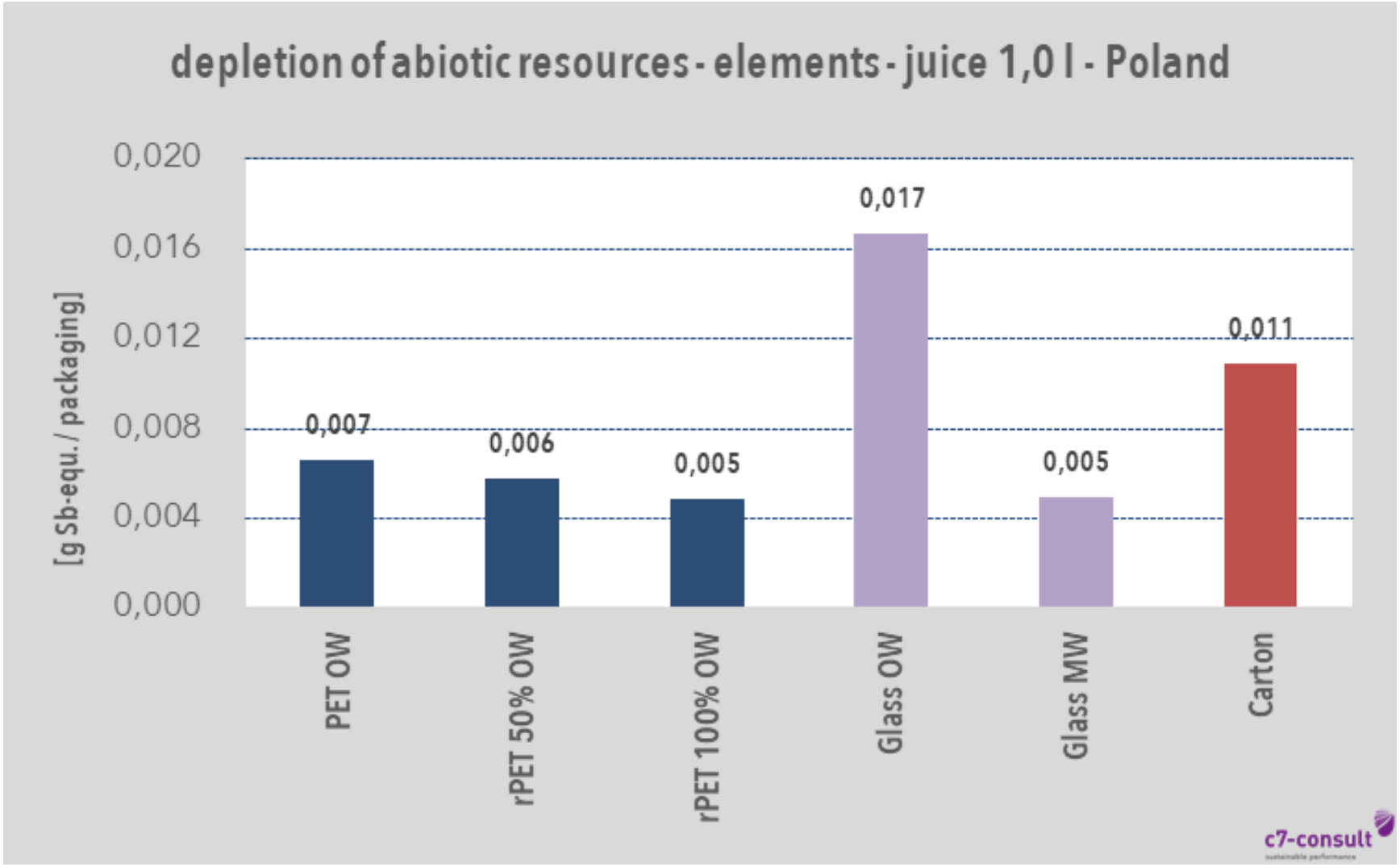
Juice


photochemical oxidation (summer smog) - juice 1,0 l - Poland
[mg ethene-equ. / packaging]
0,20
0,16
0,12
0,08
0,04
0,00
0,023
0,022
0,022
0,166
0,030
0,038
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

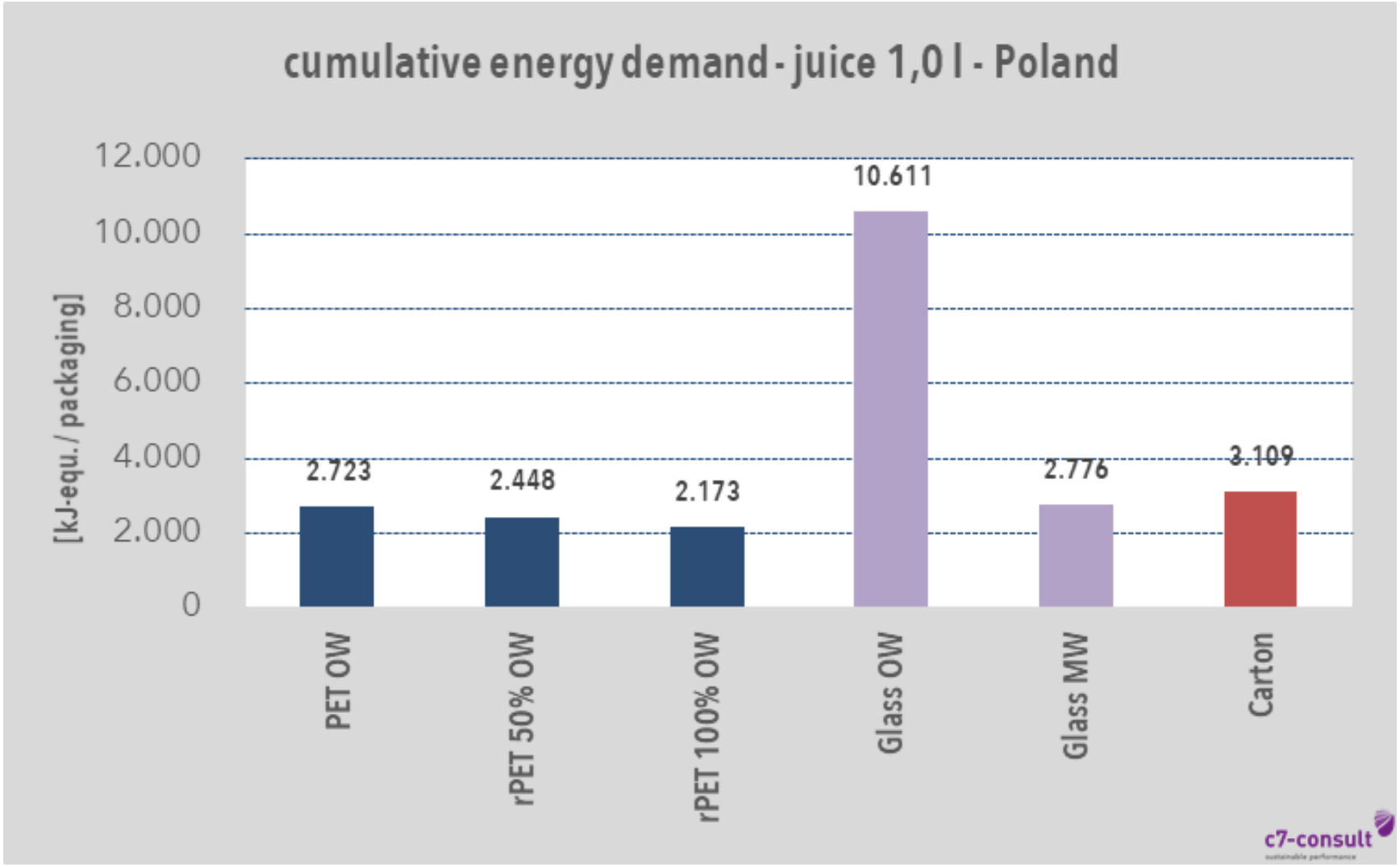
Juice


freshwater eutrophication - juice 1,0 l - Poland
[g P-equ. / packaging]
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,057
0,057
0,057
0,121
0,039
0,069
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

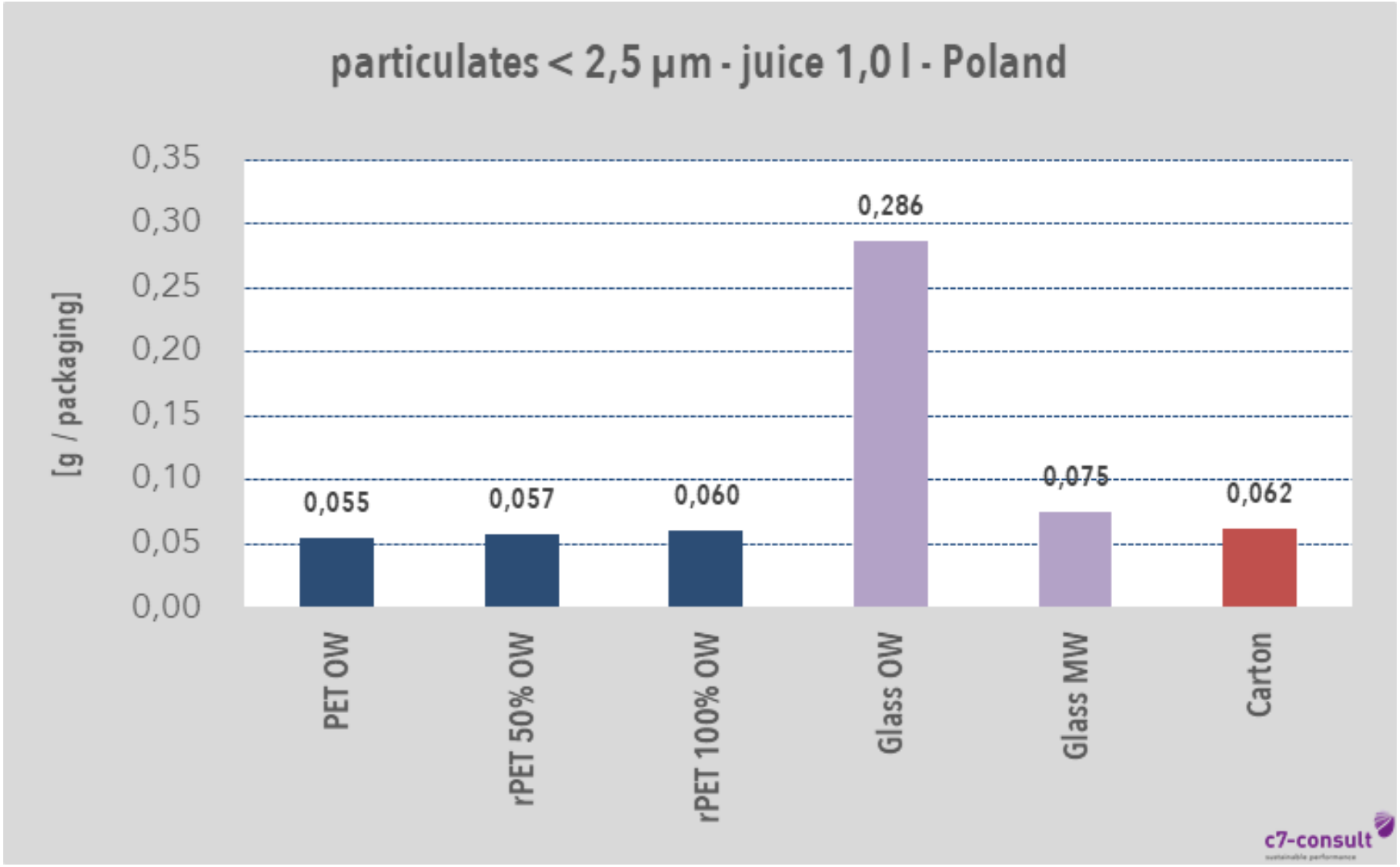
Juice


depletion of abiotic resources - elements - juice 1,0 l - Poland
[g Sb-equ. / packaging]
0,020
0,016
0,012
0,008
0,004
0,000
0,007
0,006
0,005
0,017
0,005
0,011
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

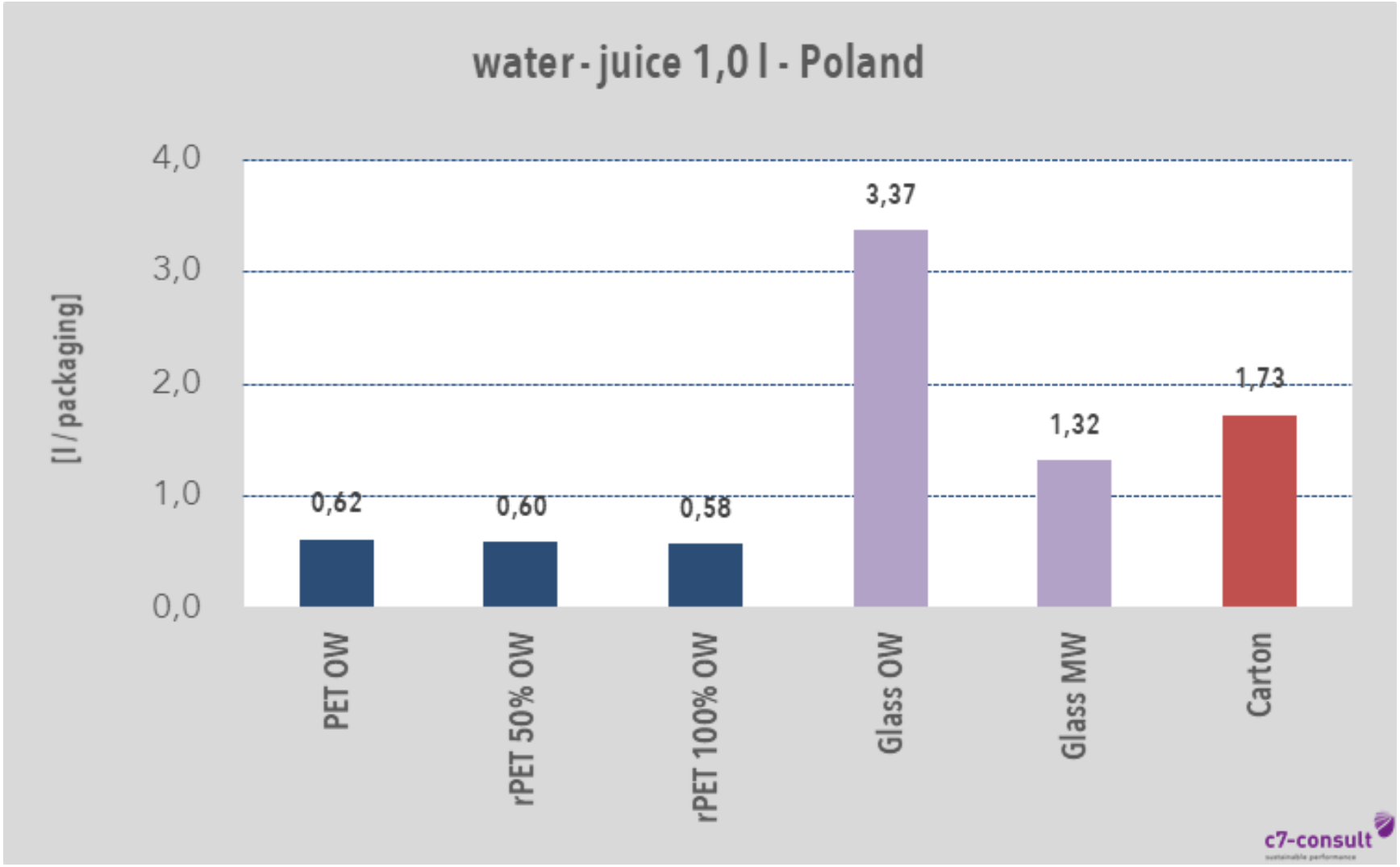
Juice


cumulative energy demand - juice 1,0 l - Poland
[kJ-equ./ packaging]
12.000
10.000
8.000
6.000
4.000
2.000
0
2.723
2.448
2.173
10.611
2.776
3.109
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

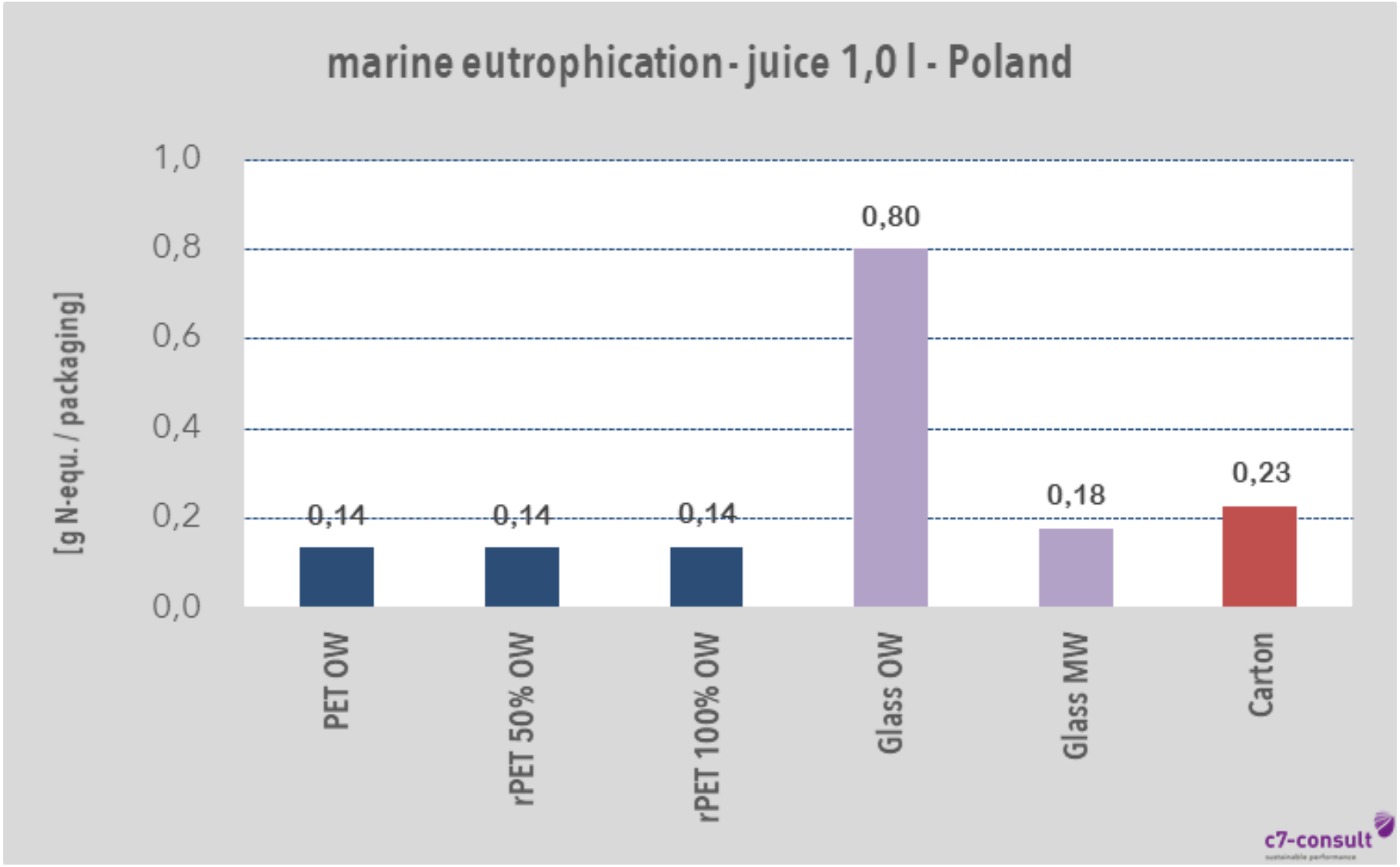
Juice


particulates < 2,5 µm - juice 1,0 l - Poland
[g / packaging]
0,35
0,30
0,25
0,20
0,15
0,10
0,05
0,00
0,055
0,057
0,060
0,286
0,075
0,062
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

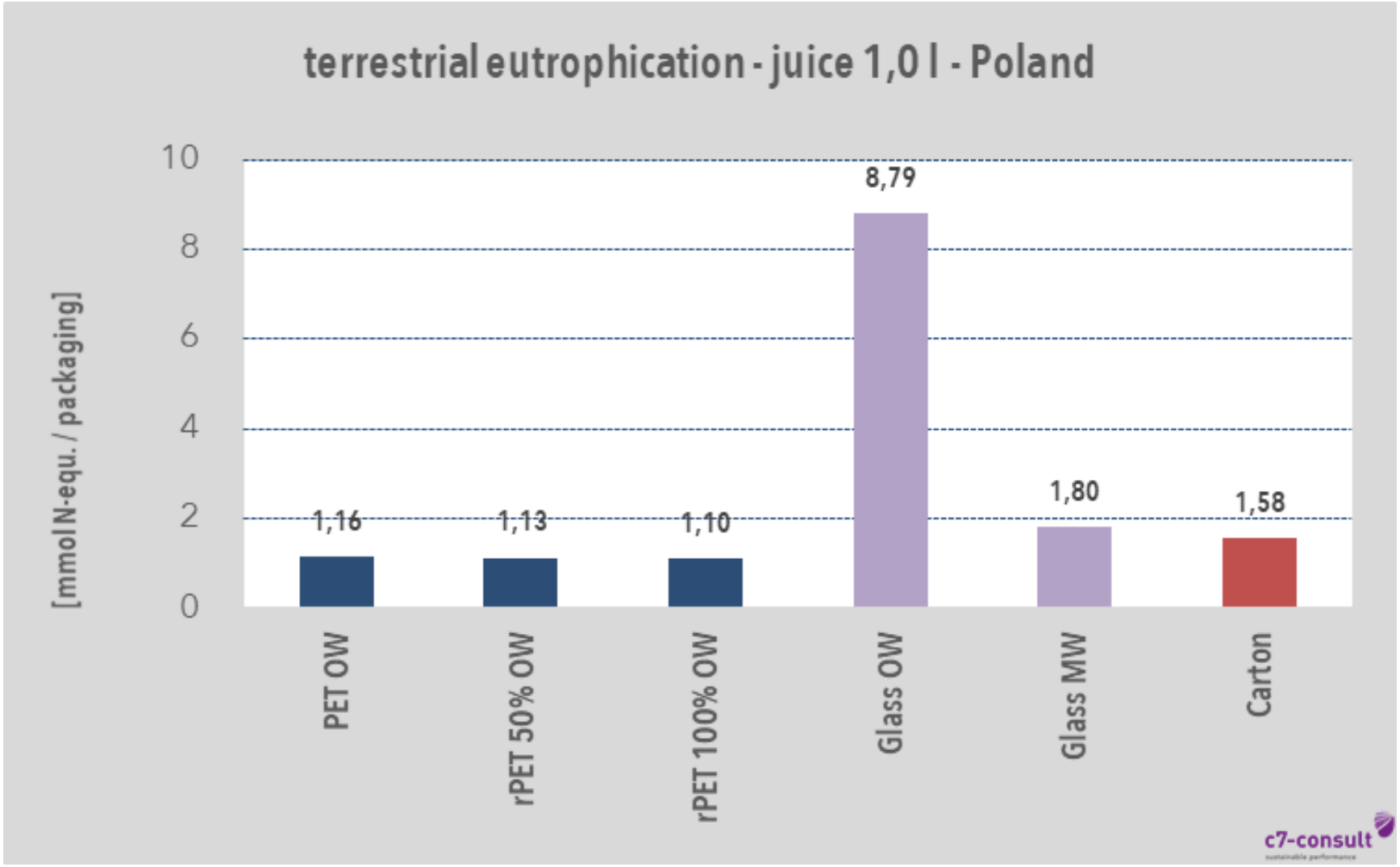
Juice


water - juice 1,0 l - Poland
[l / packaging]
4,0
3,0
2,0
1,0
0,0
0,62
0,60
0,58
3,37
1,32
1,73
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

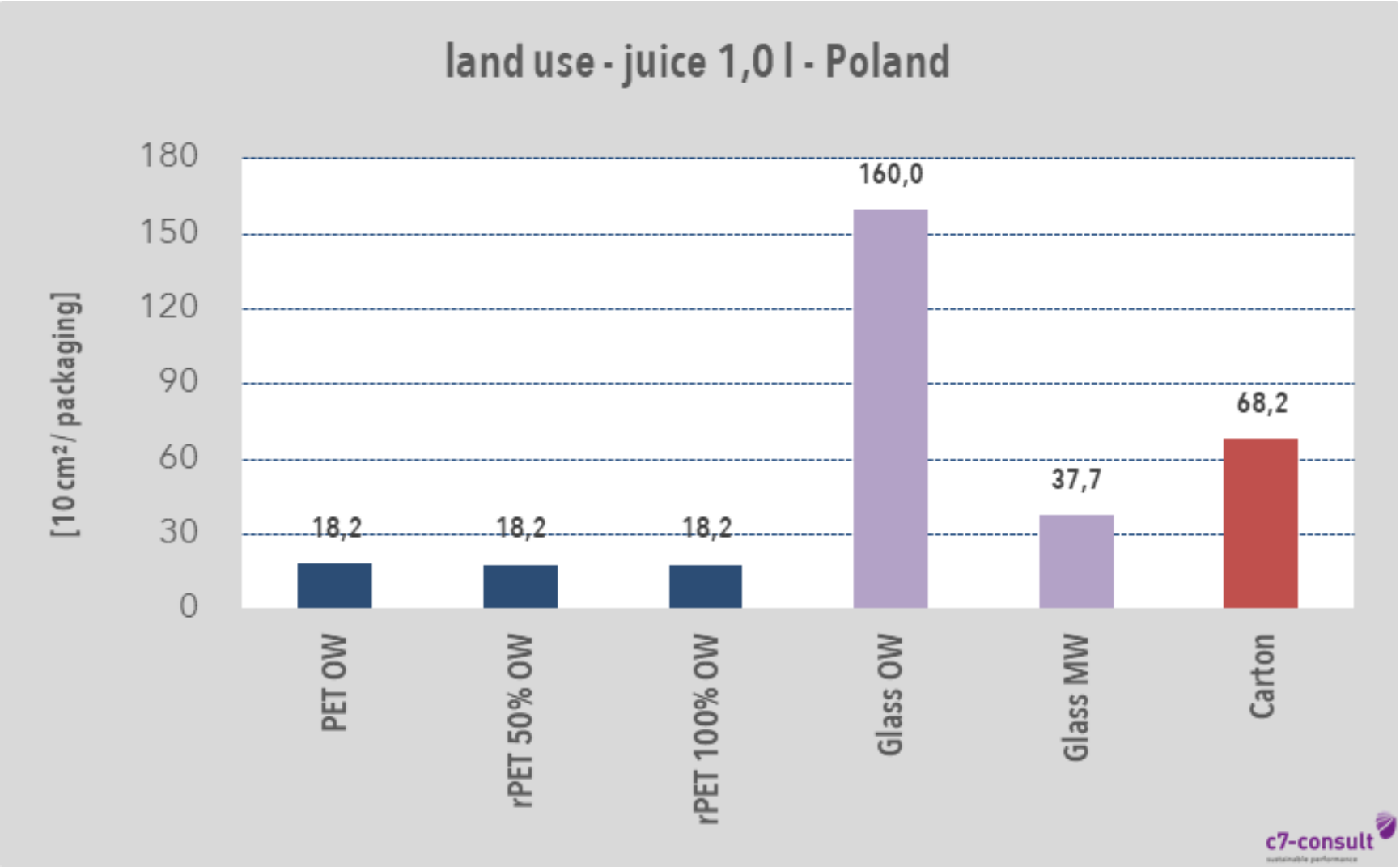
Juice


marine eutrophication - juice 1,0 l - Poland
[g N-equ. / packaging]
1,0
0,8
0,6
0,4
0,2
0,0
0,14
0,14
0,14
0,80
0,18
0,23
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

Juice


terrestrial eutrophication - juice 1,0 l - Poland
[mmol N-equ. / packaging]
10
8
6
4
2
0
1,16
1,13
1,10
8,79
1,80
1,58
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

Juice


land use - juice 1,0 l - Poland
[10 cm² / packaging]
180
150
120
90
60
30
0
18,2
18,2
18,2
160,0
37,7
68,2
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
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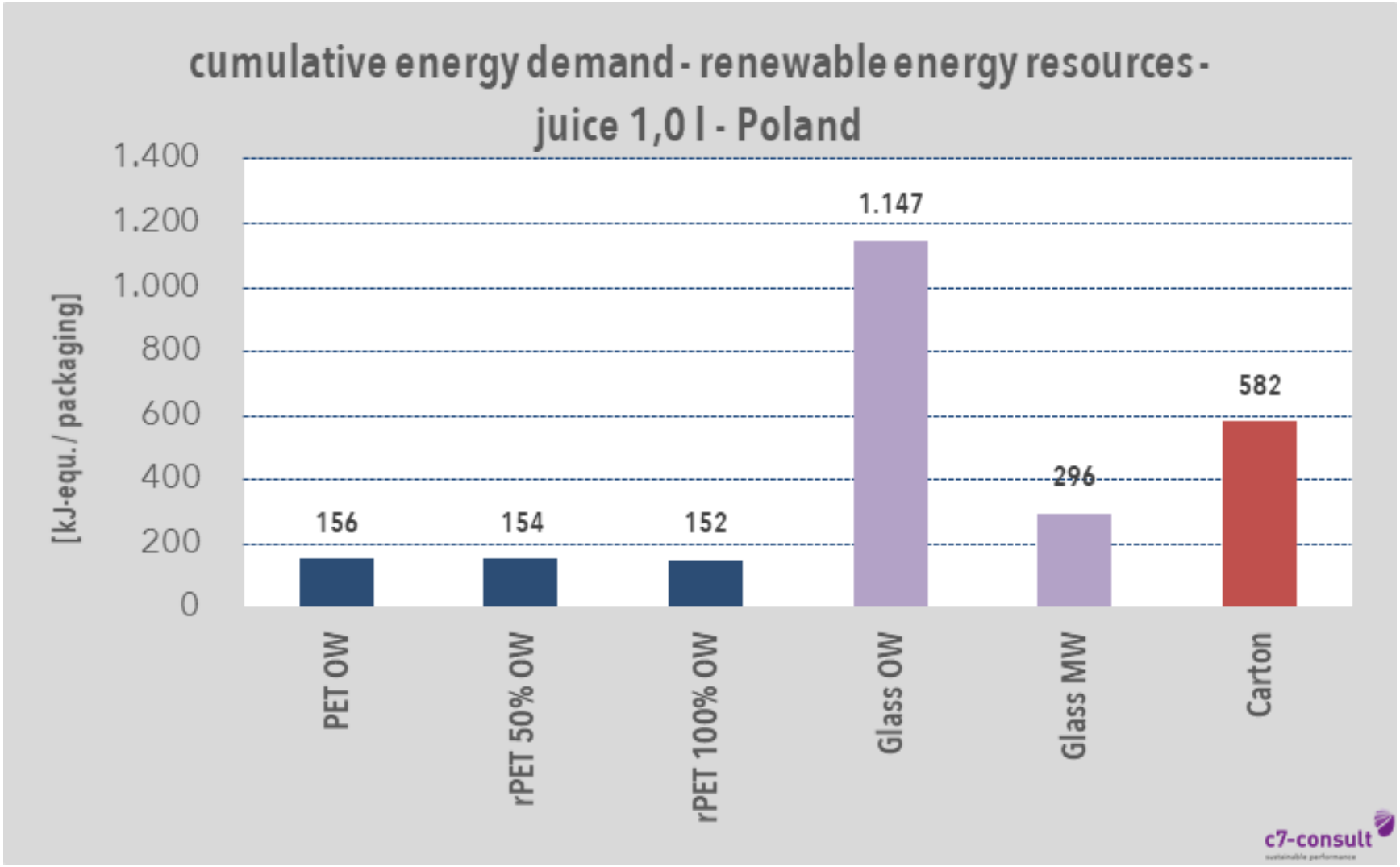
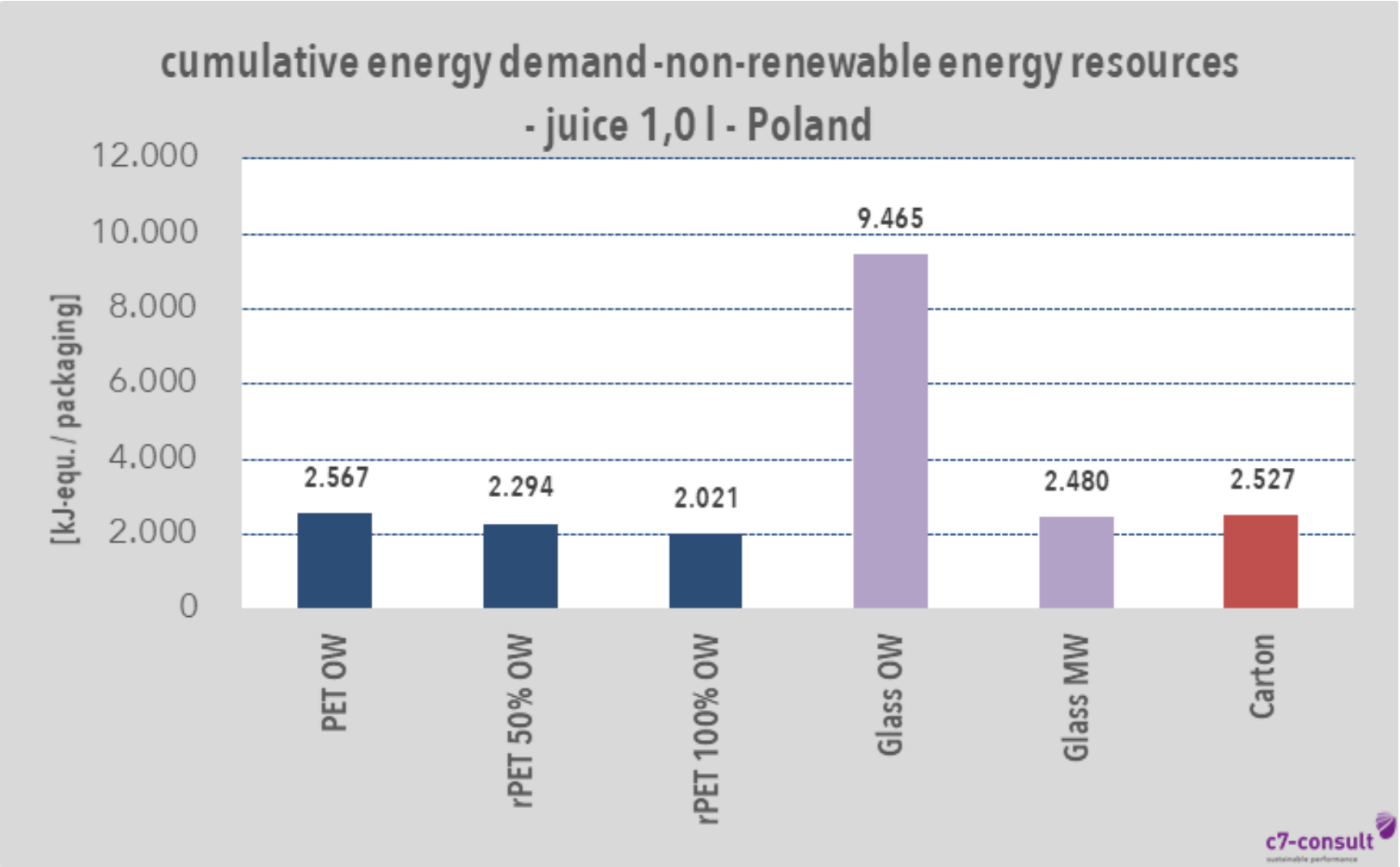
Juice


cumulative energy demand - renewable energy resources - juice 1,0 l - Poland
[kJ-equ./ packaging]
1.400
1.200
1.000
800
600
400
200
0
156
154
152
1.147
296
582
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
c7-consult

Juice


cumulative energy demand -non-renewable energy resources
- juice 1,0 l - Poland
[kJ-equ./ packaging]
12.000
10.000
8.000
6.000
4.000
2.000
0
2.567
2.294
2.021
9.465
2.480
2.527
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
Carton
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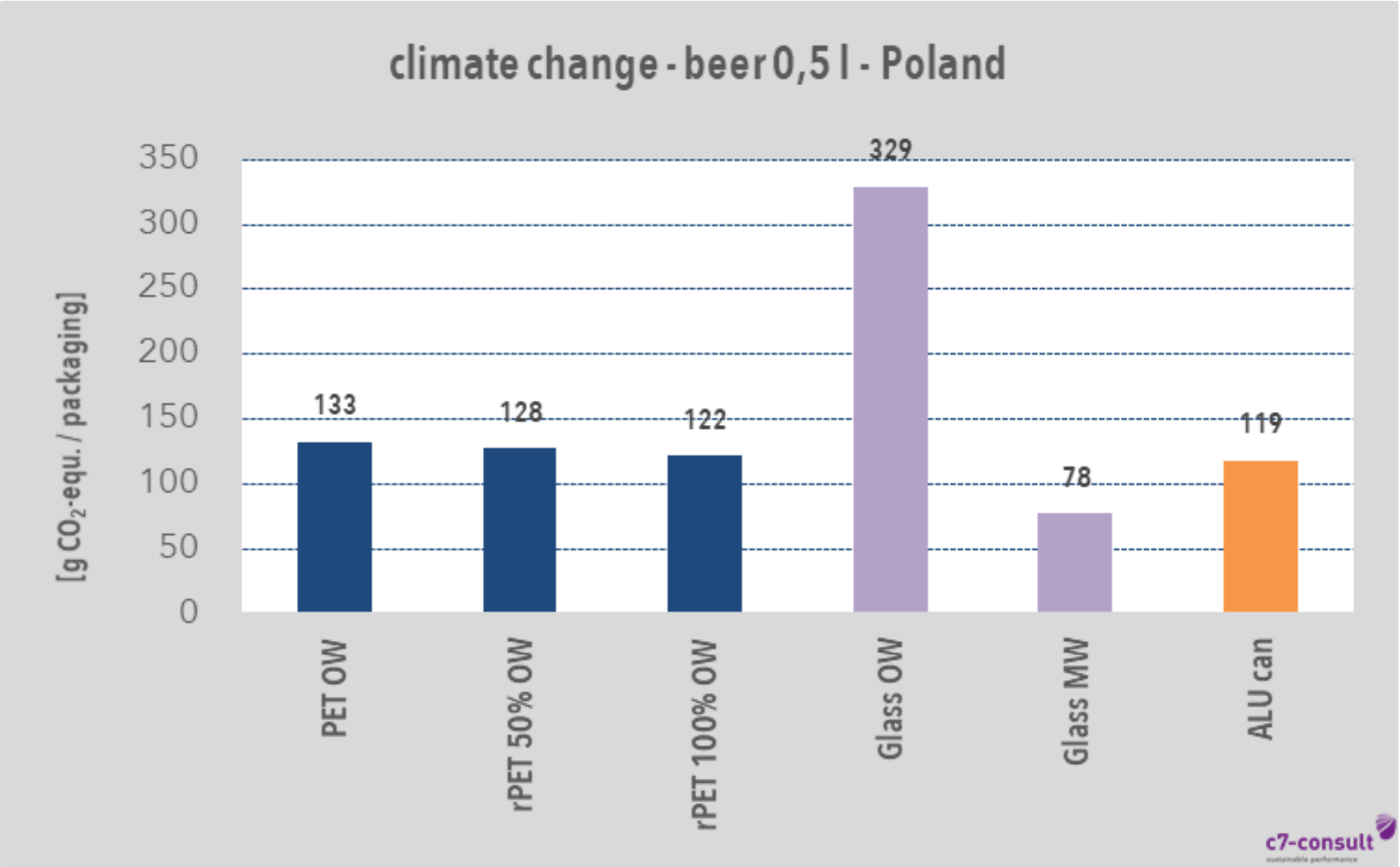
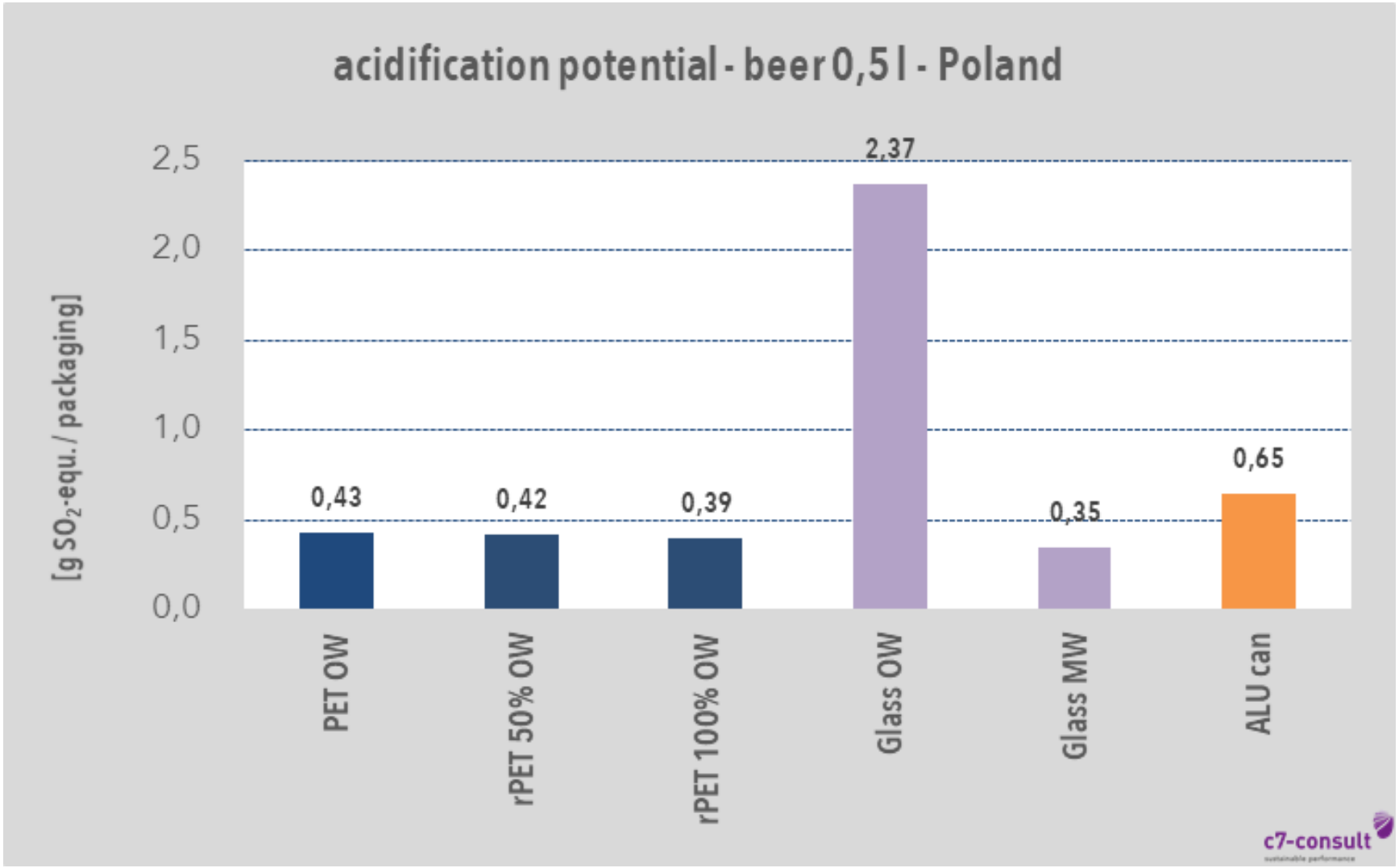
sustainable performance

Results Beer 0,5 l

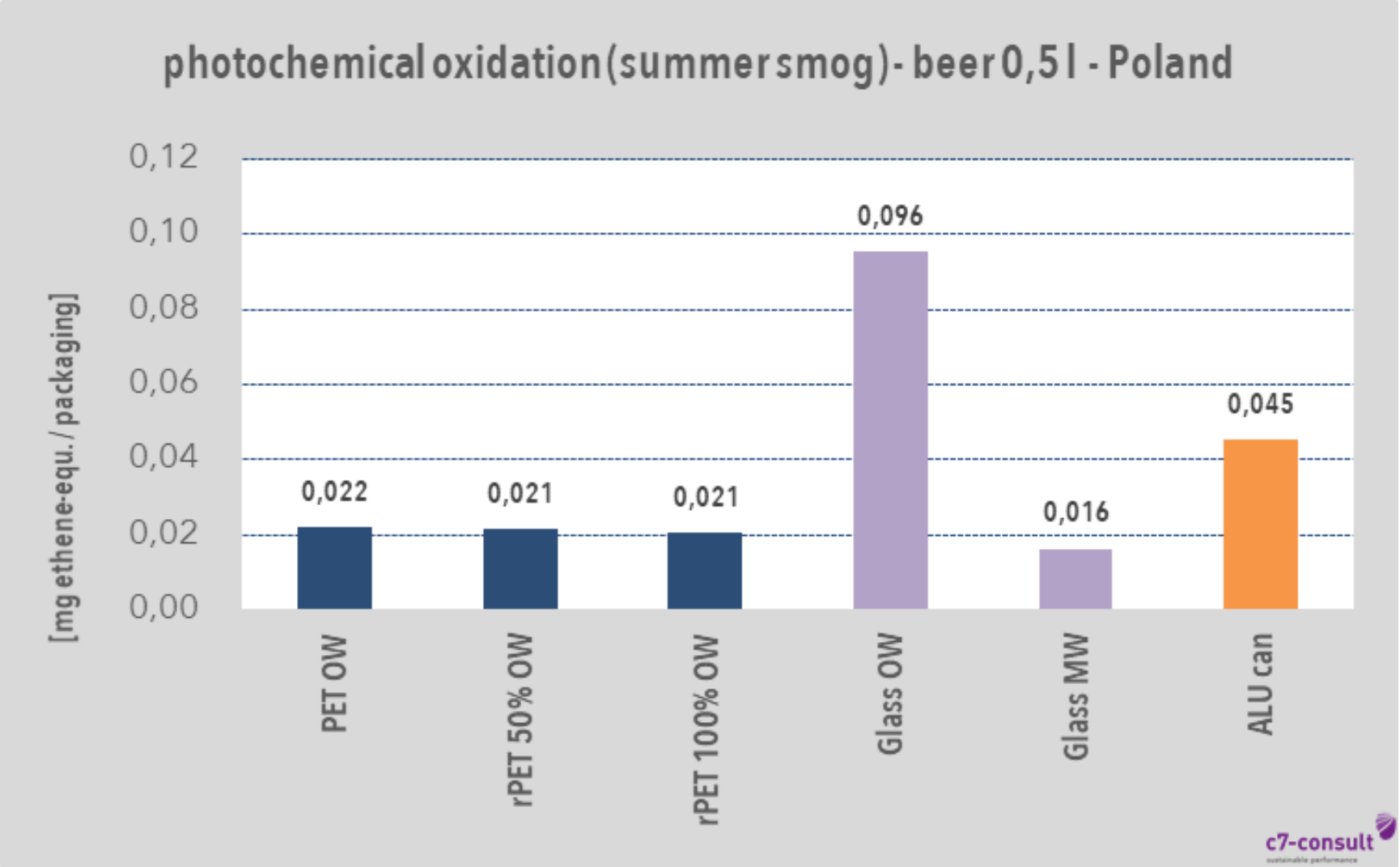
Beer


climate change - beer 0,5 l - Poland
[g CO_2-equ. / packaging]
350
300
250
200
150
100
50
0
133
128
122
329
78
119
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

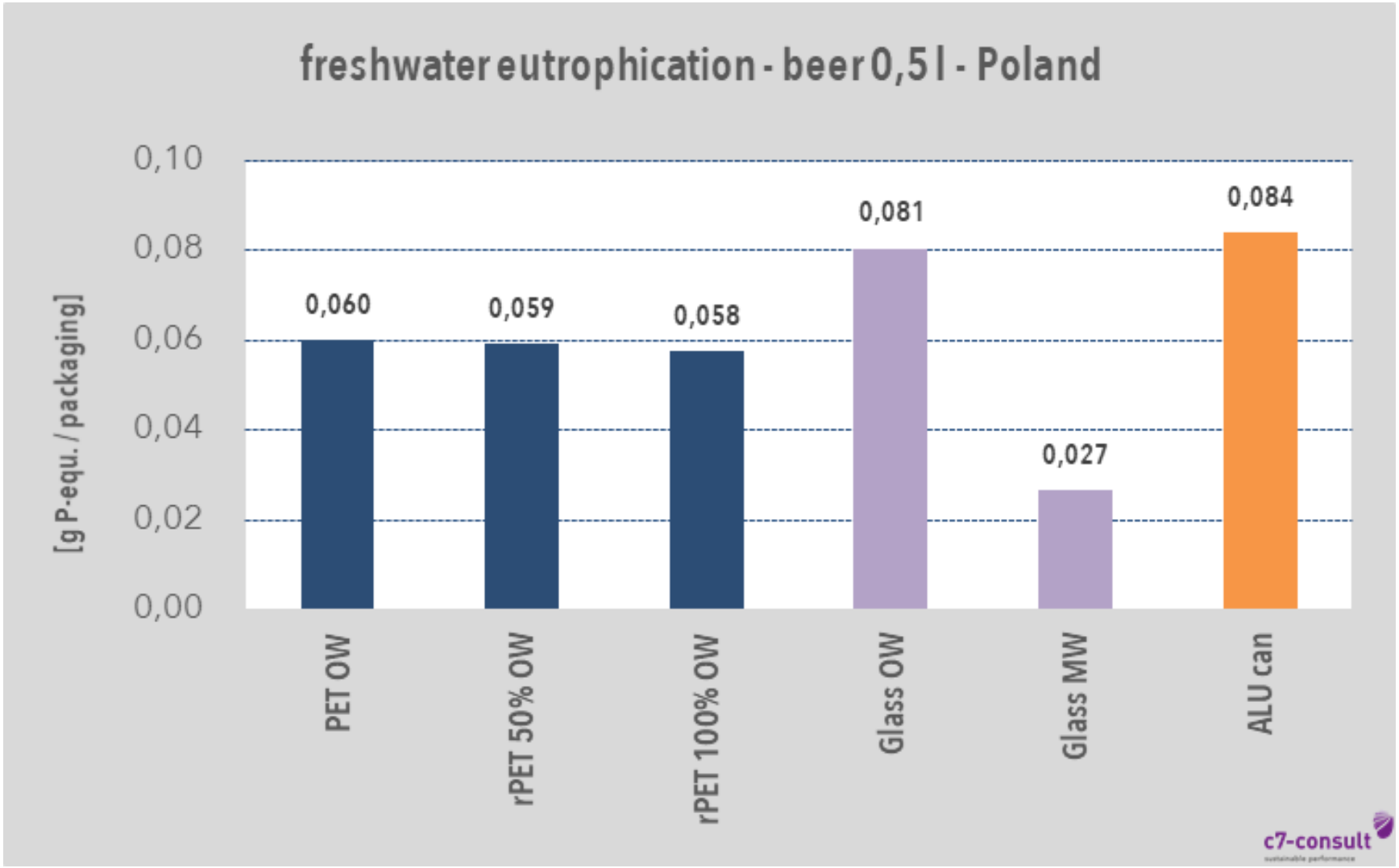
Beer


acidification potential - beer 0,5 l - Poland
[g SO2-equ. / packaging]
2,5
2,0
1,5
1,0
0,5
0,0
0,43
0,42
0,39
2,37
0,35
0,65
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

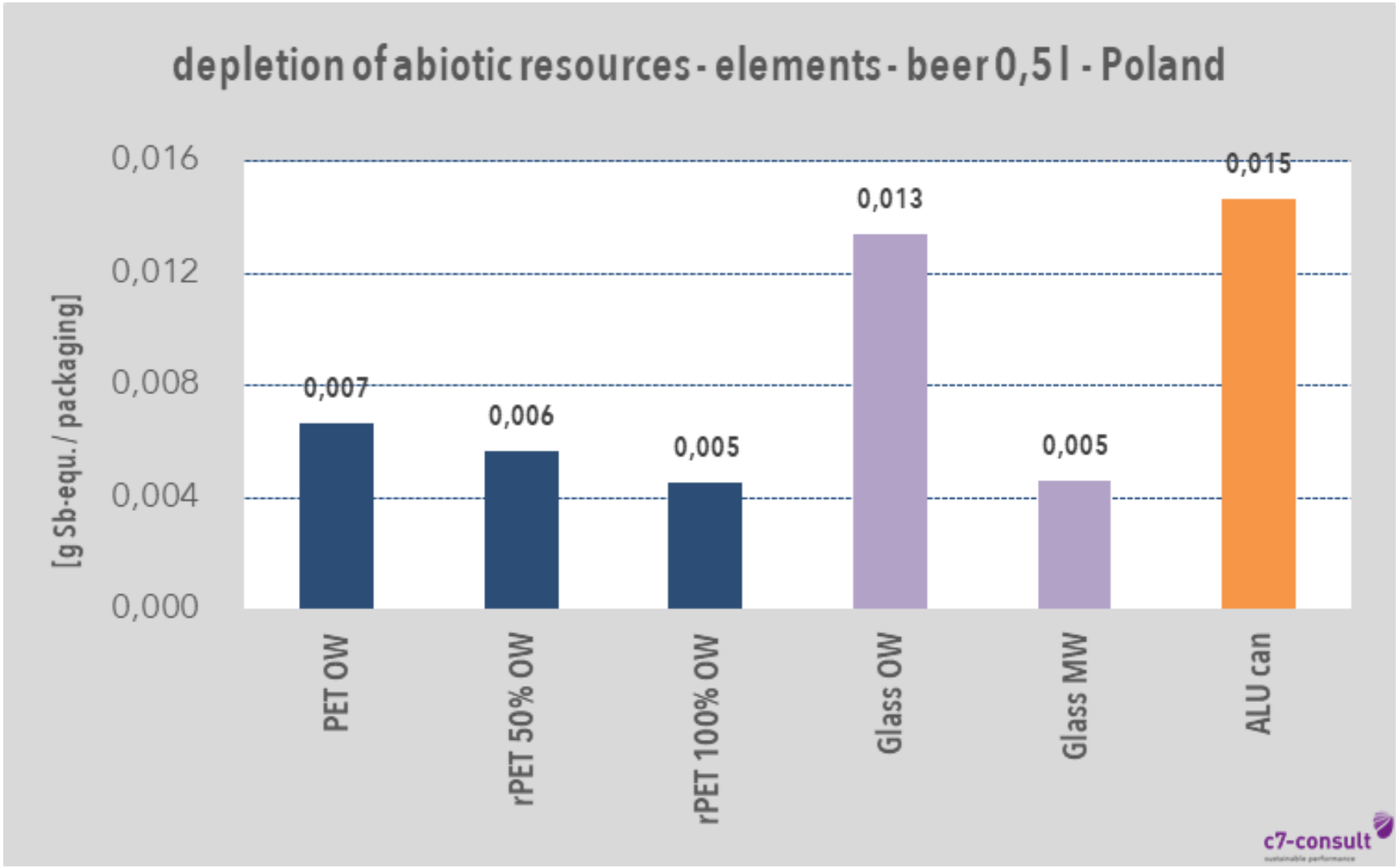
Beer


photochemical oxidation (summer smog) - beer 0,5 l - Poland
[mg ethene-equ. / packaging]
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,022
0,021
0,021
0,096
0,016
0,045
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

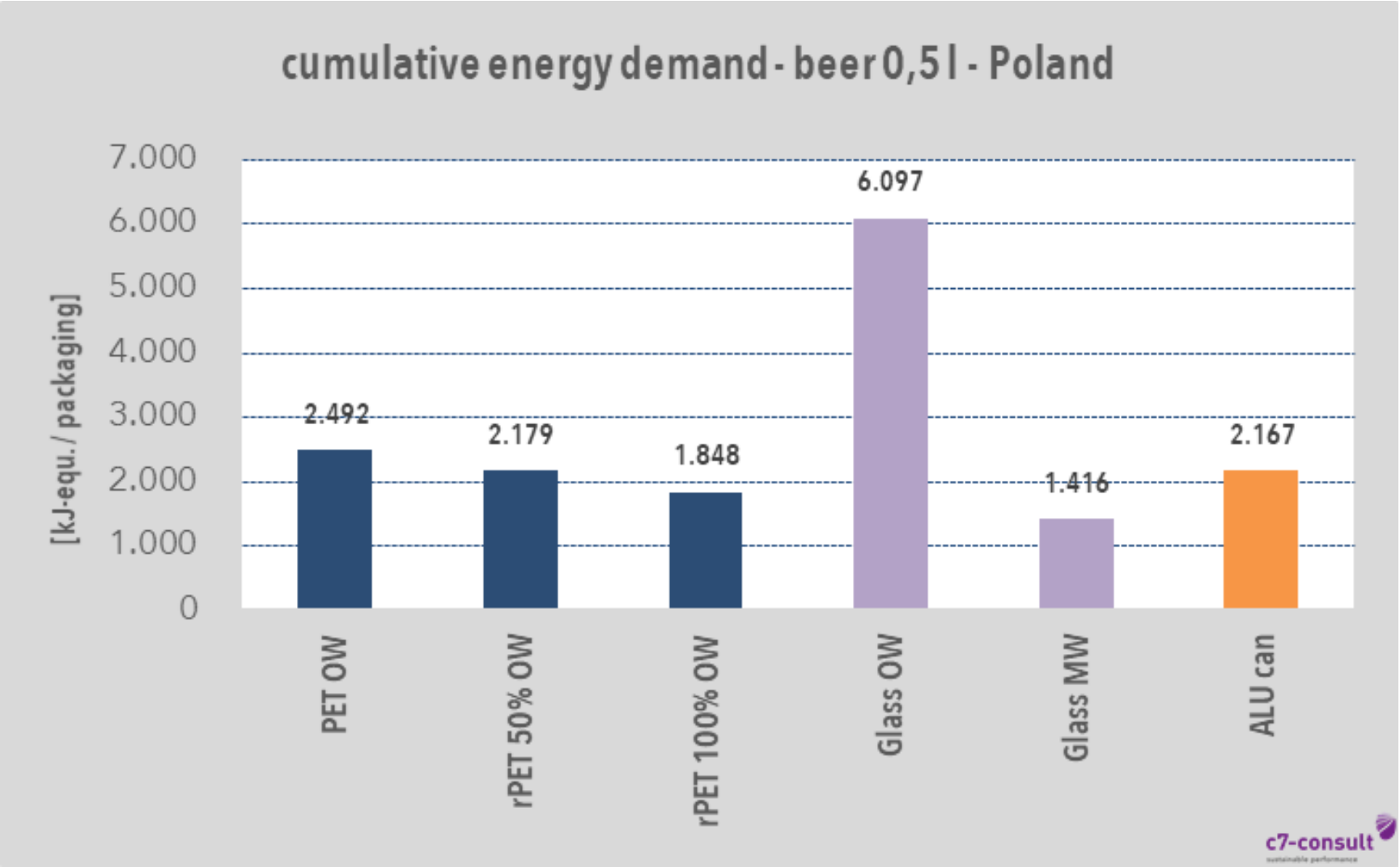
Beer


freshwater eutrophication - beer 0,5 l - Poland
[g P-equ. / packaging]
0,10
0,08
0,06
0,04
0,02
0,00
0,060
0,059
0,058
0,081
0,027
0,084
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

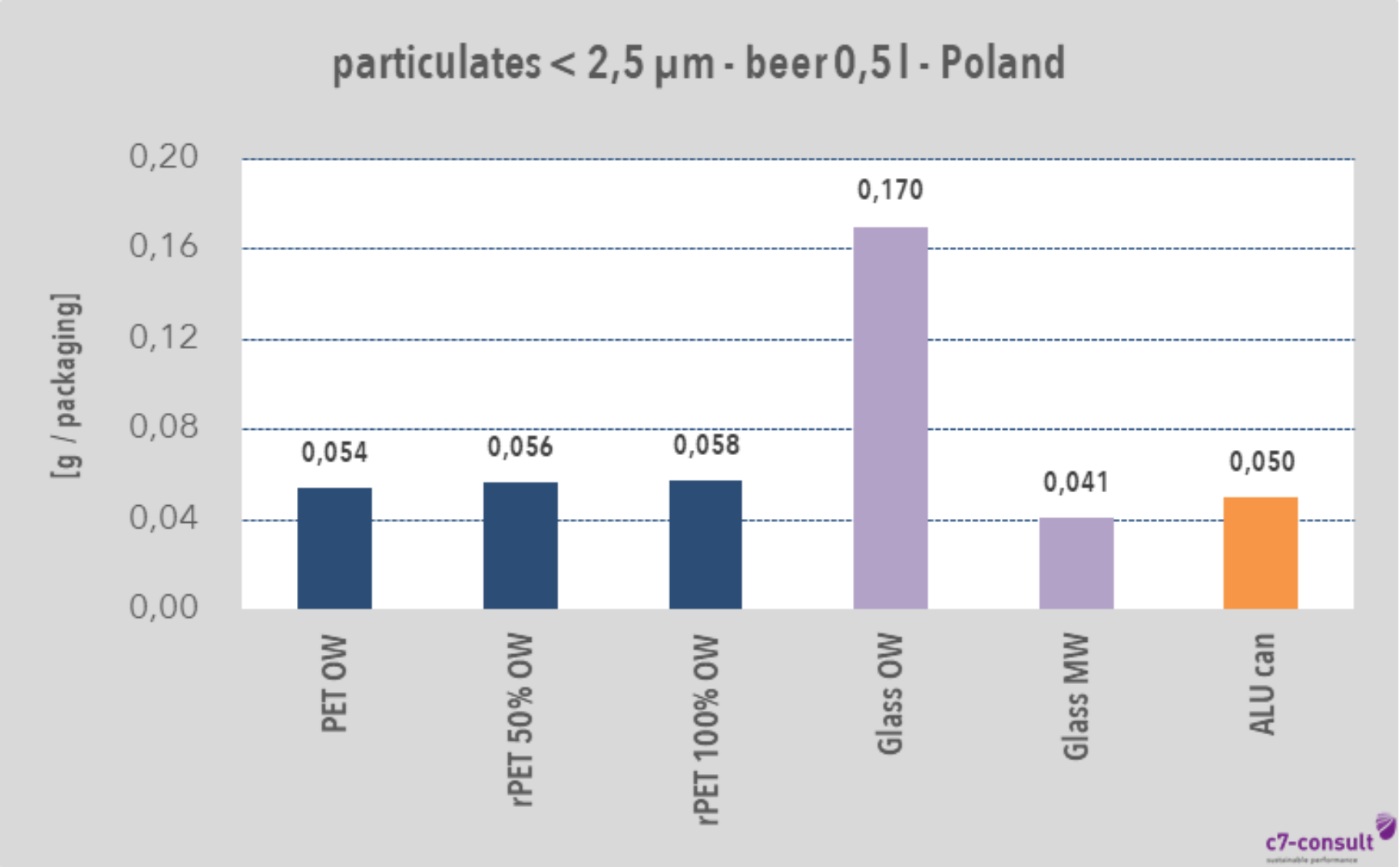
Beer


depletion of abiotic resources - elements - beer 0,5 l - Poland
[g Sb-equ. / packaging]
0,016
0,012
0,008
0,004
0,000
0,007
0,006
0,005
0,013
0,005
0,015
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

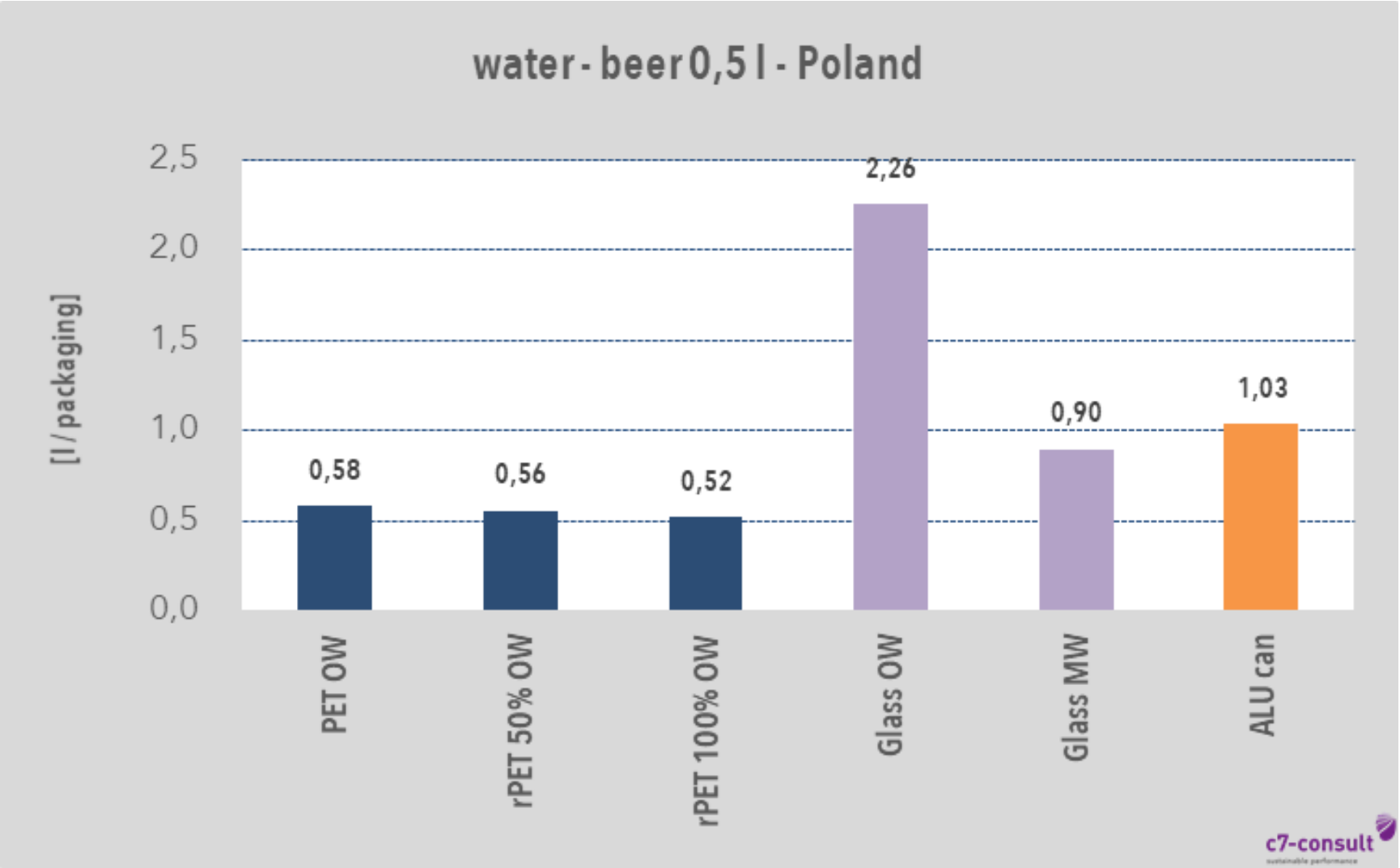
Beer


cumulative energy demand - beer 0,5 l - Poland
[kJ-equ./ packaging]
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0
2.492
2.179
1.848
6.097
1.416
2.167
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

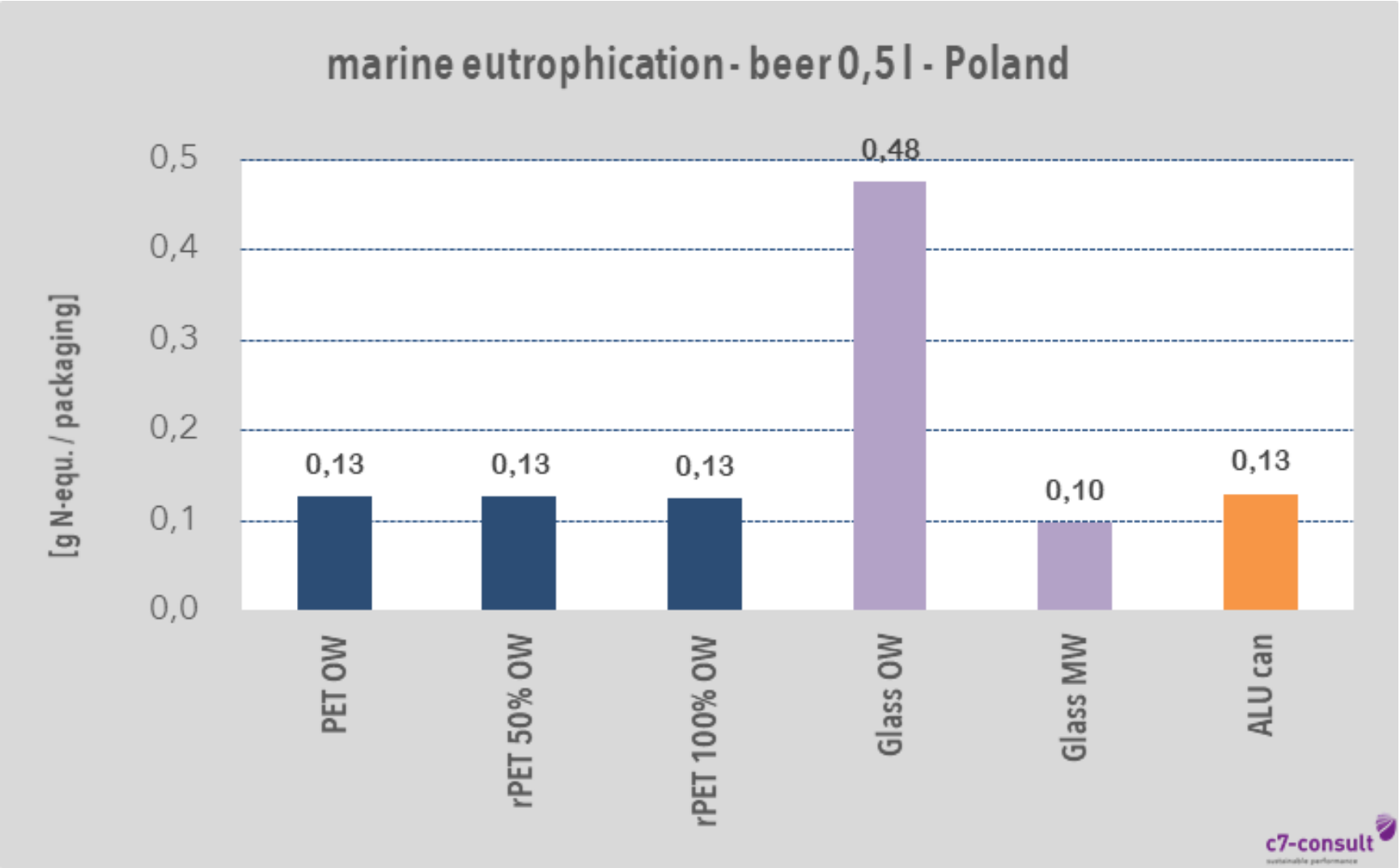
Beer


particulates < 2,5 µm - beer 0,5 l - Poland
[g / packaging]
0,20
0,16
0,12
0,08
0,04
0,00
0,054
0,056
0,058
0,170
0,041
0,050
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

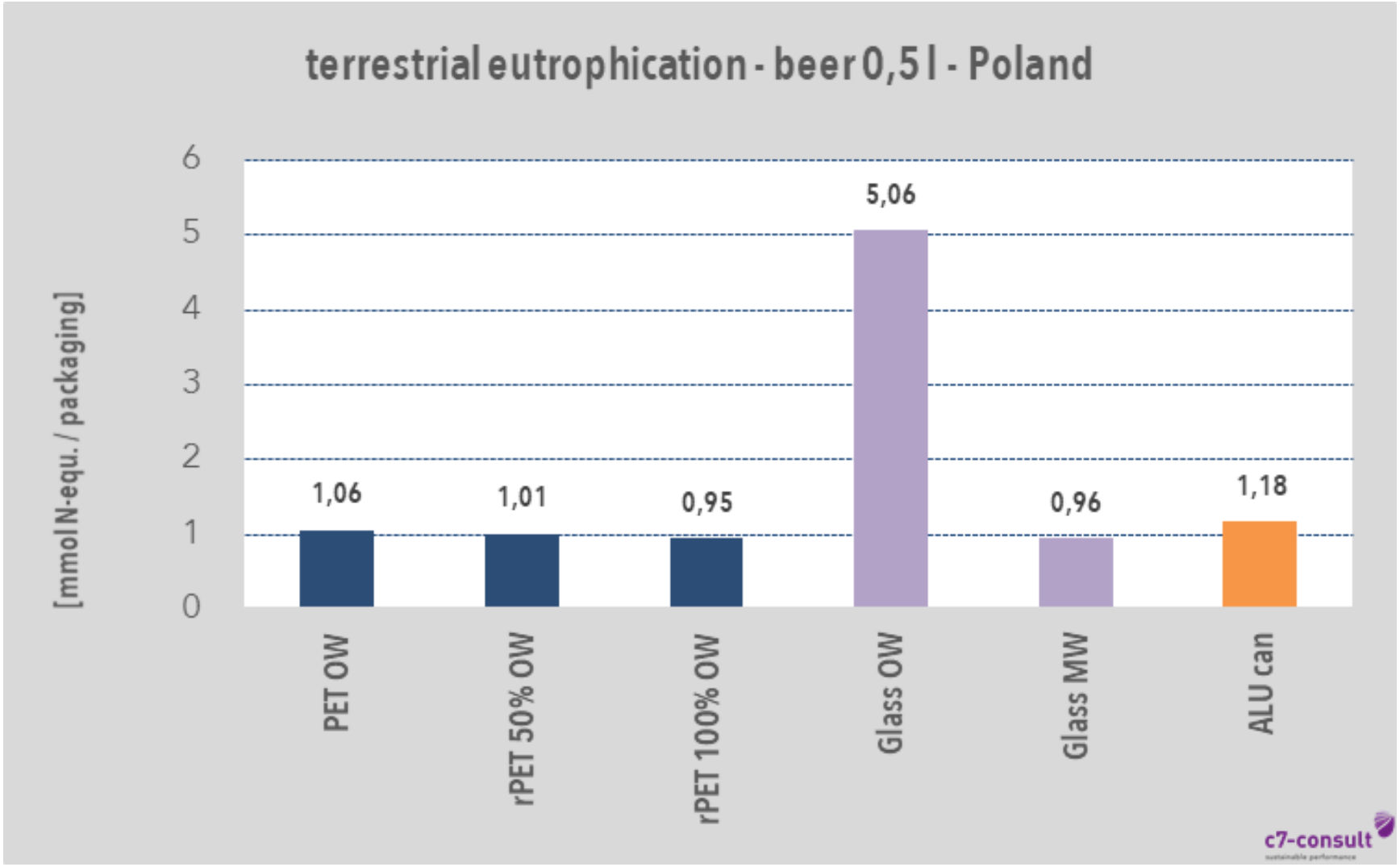
Beer


water - beer 0,5 l - Poland
[l / packaging]
2,5
2,0
1,5
1,0
0,5
0,0
0,58
0,56
0,52
2,26
0,90
1,03
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

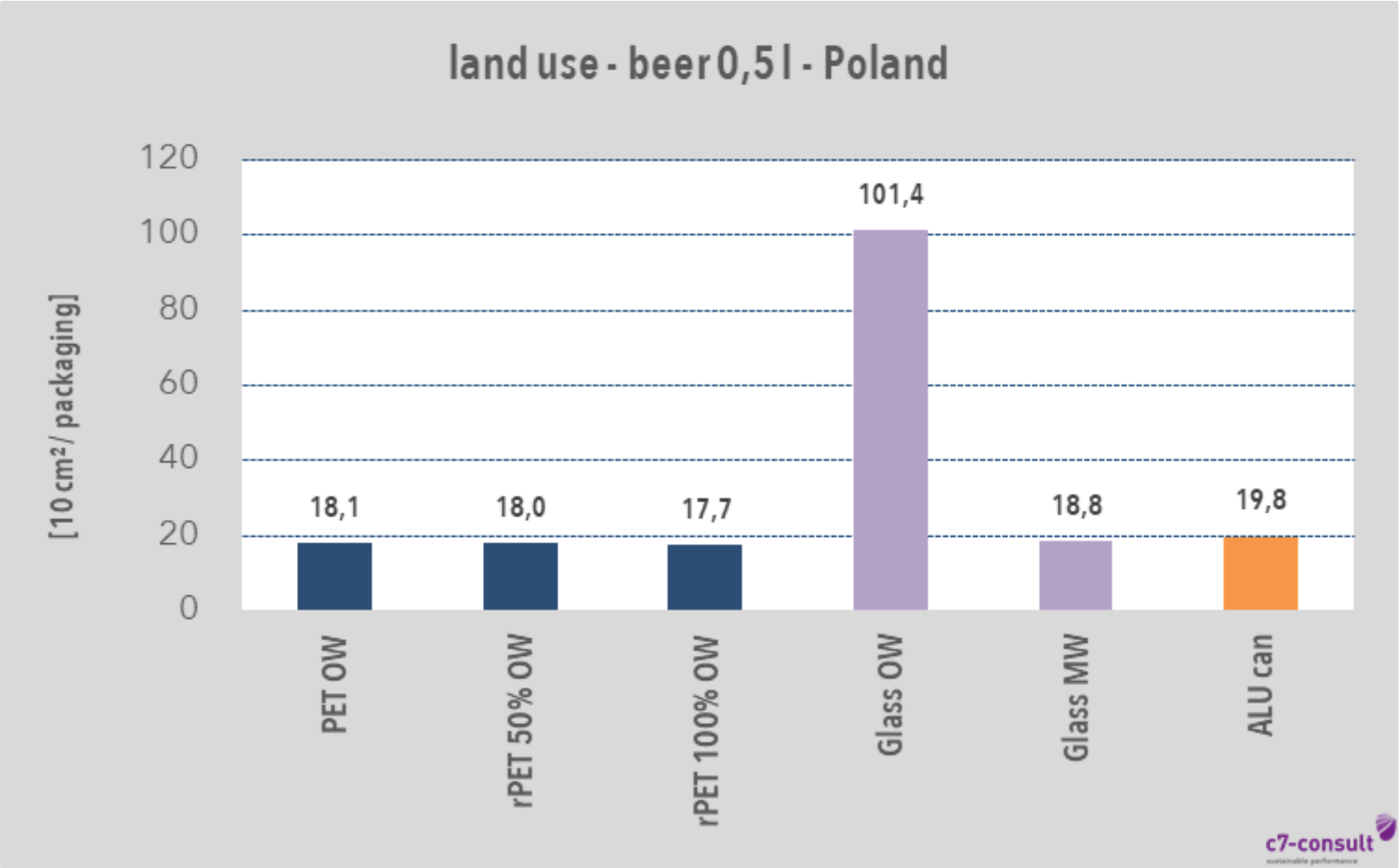
Beer


marine eutrophication - beer 0,5 l - Poland
[g N-equ. / packaging]
0,5
0,4
0,3
0,2
0,1
0,0
0,13
0,13
0,13
0,48
0,10
0,13
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

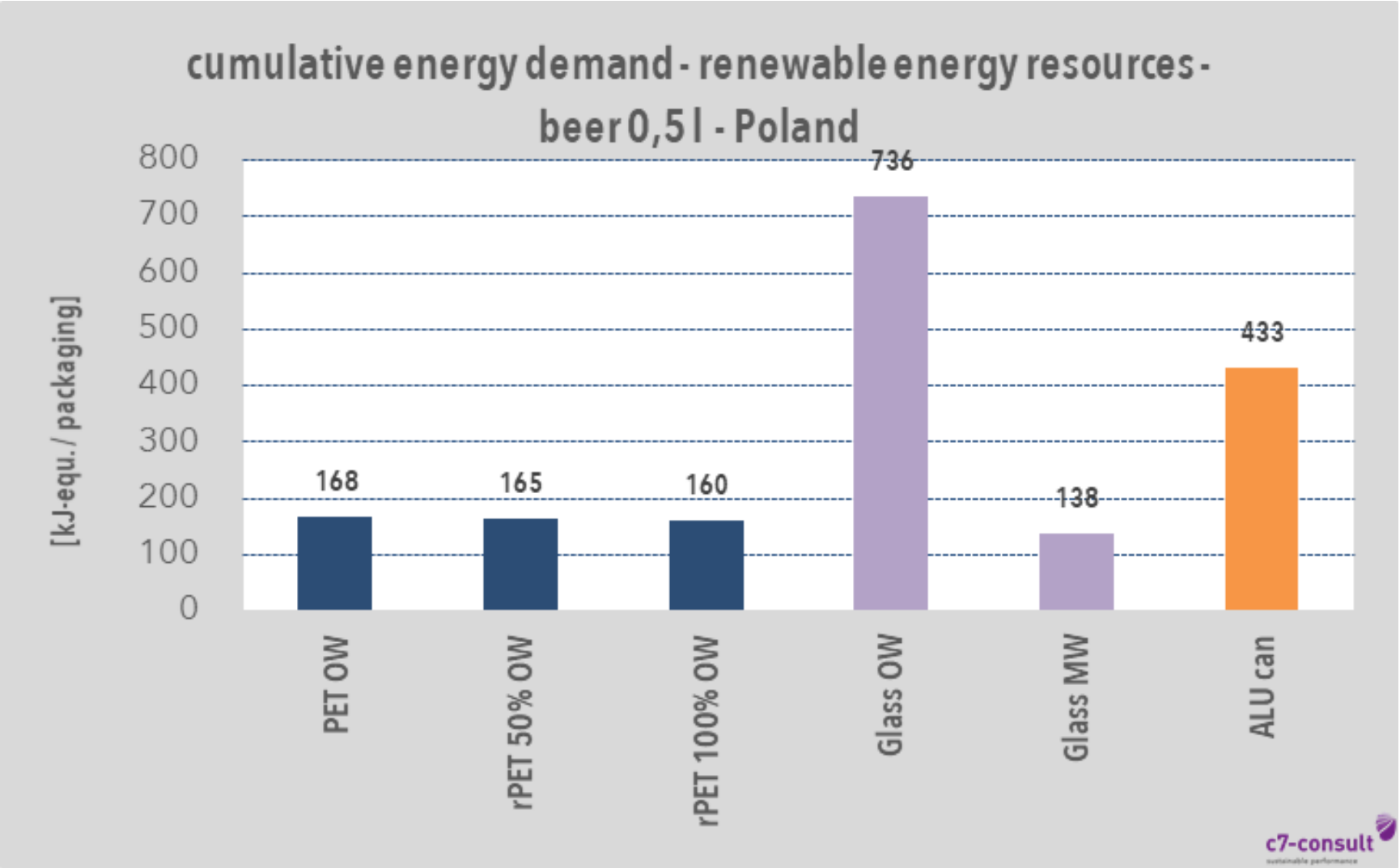
Beer


terrestrial eutrophication - beer 0,5 l - Poland
[mmol N-equ. / packaging]
0
1
2
3
4
5
6
1,06
1,01
0,95
5,06
0,96
1,18
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

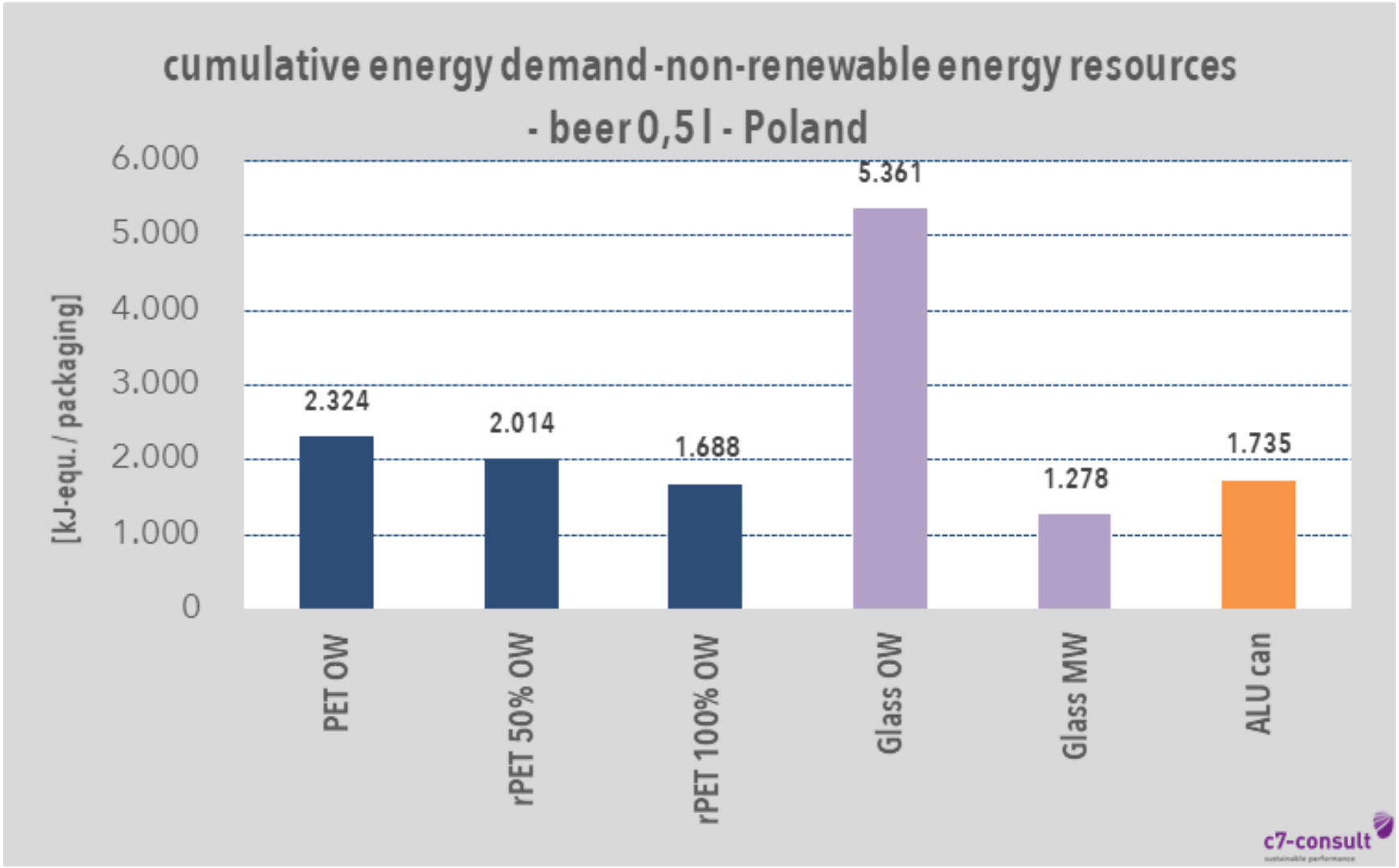
Beer


land use - beer 0,5 l - Poland
[10 cm² / packaging]
120
100
80
60
40
20
0
18,1
18,0
17,7
101,4
18,8
19,8
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

Beer


cumulative energy demand - renewable energy resources - beer 0,5 l - Poland
[kJ-equ./ packaging]
800
700
600
500
400
300
200
100
0
168
165
160
736
138
433
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

Beer


cumulative energy demand -non-renewable energy resources
- beer 0,5 l - Poland
[kJ-equ./ packaging]
6.000
5.000
4.000
3.000
2.000
1.000
0
2.324
2.014
1.688
5.361
1.278
1.735
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
Glass MW
ALU can
c7-consult

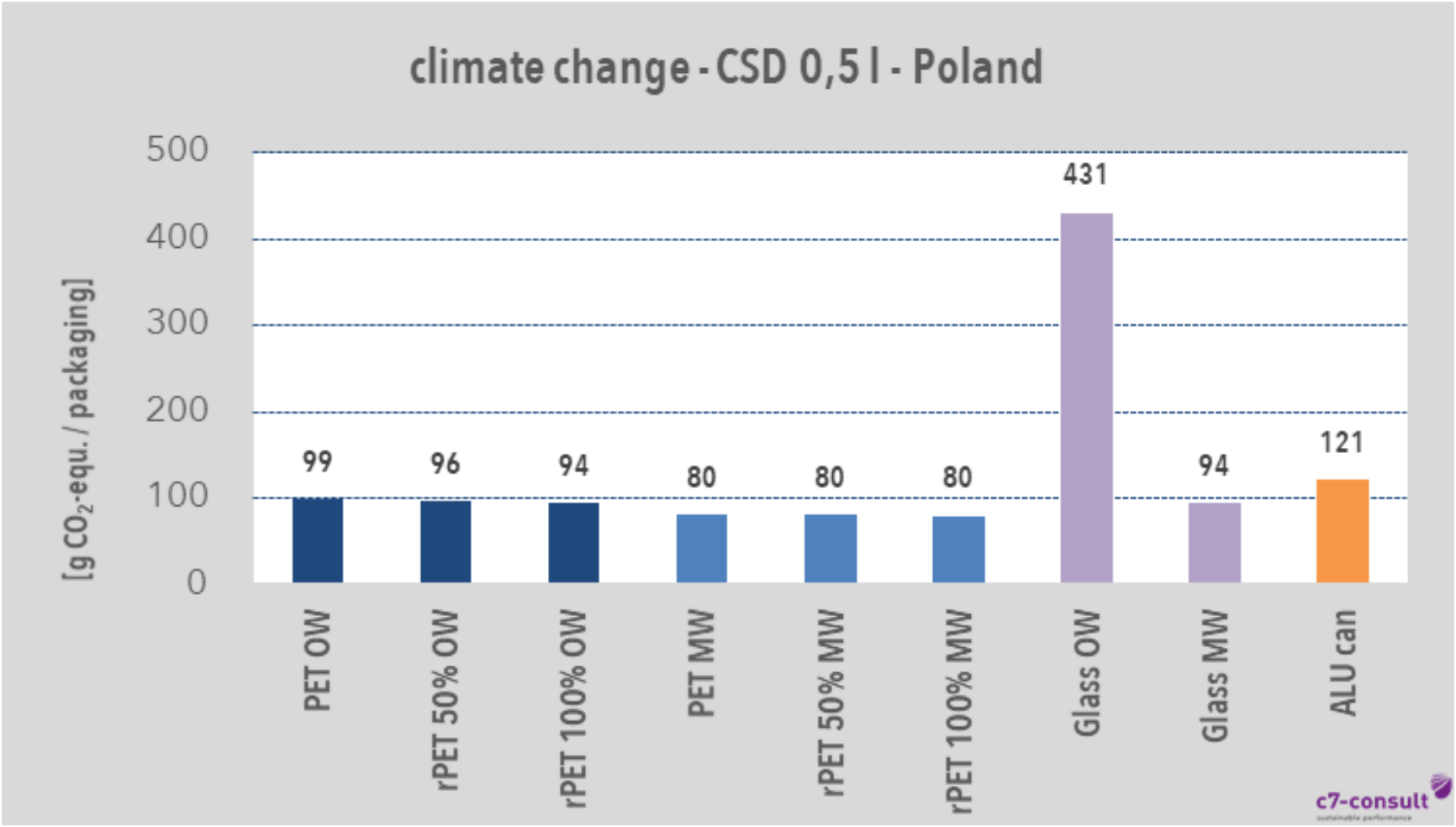
c7-consult
sustainable performance

Results Carbonated Soft Drinks 0,5 l

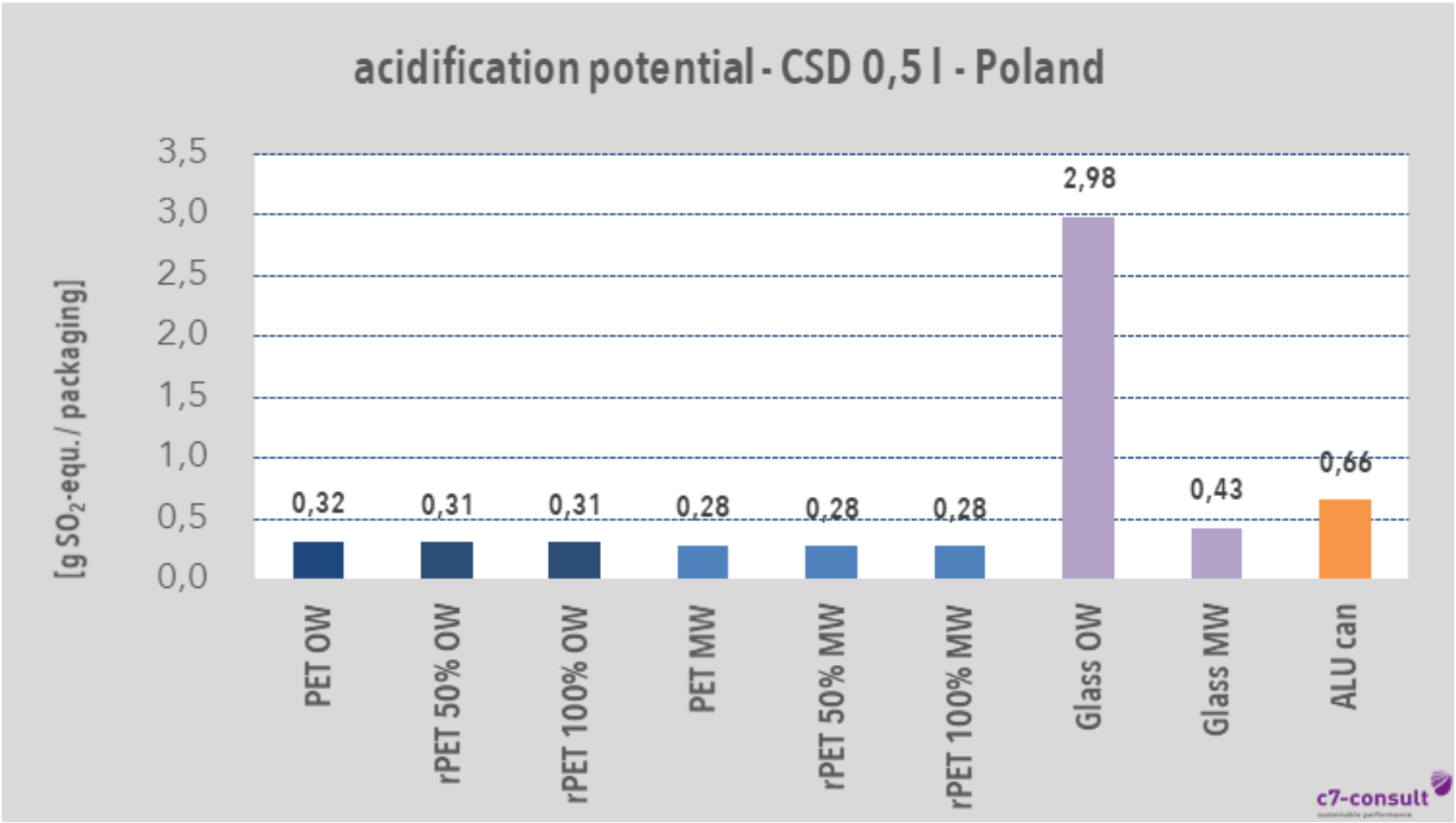
c7-consult e.U. A-2453 Sommerein, Lindau 21 T +43 2168 62 861 E office@c7-consult.at W www.c7-consult.at

MEMBER OF TEAM ZF

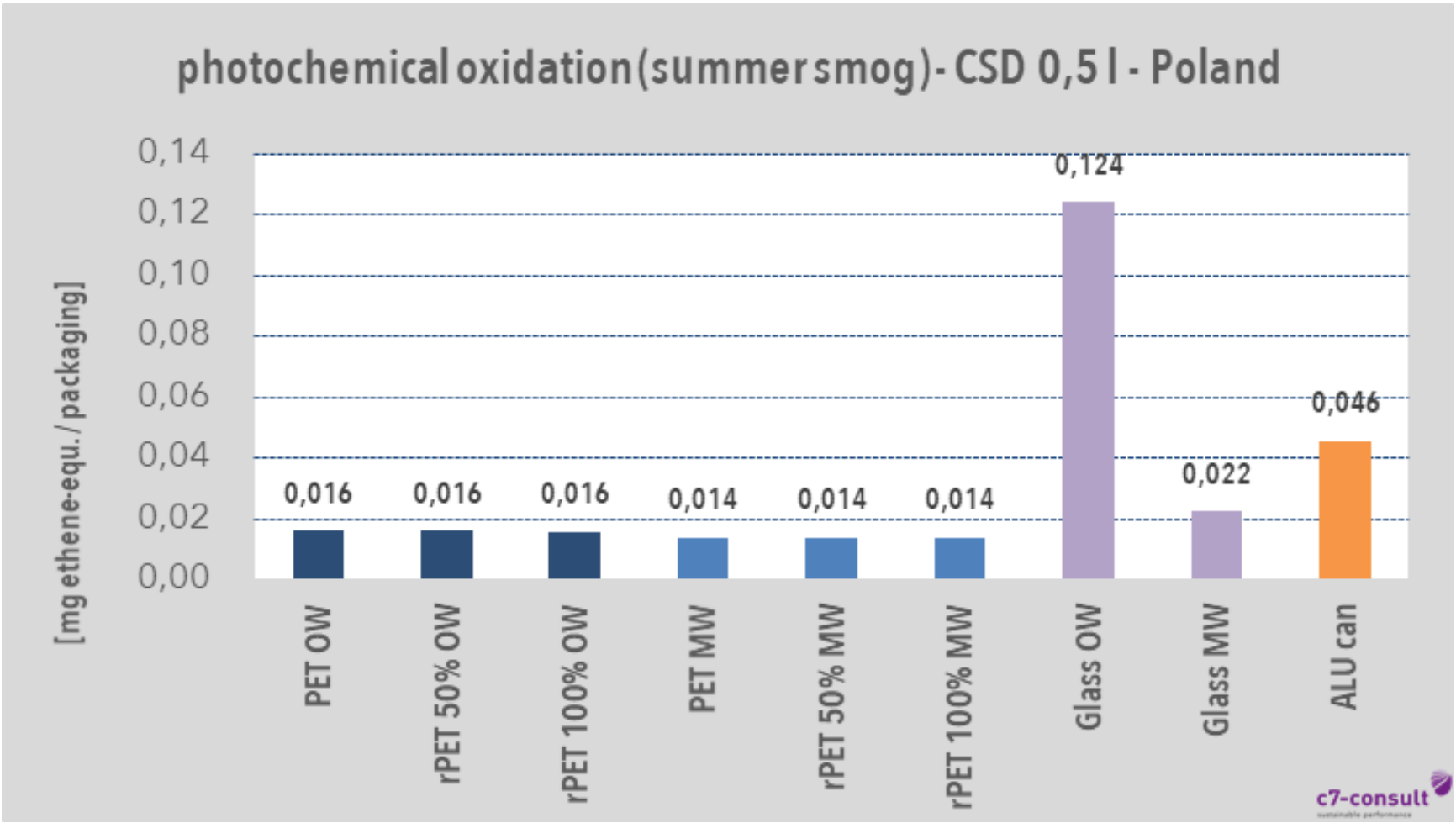
CSD


climate change - CSD 0,5 l - Poland
[g CO2-equ. / packaging]
500
400
300
200
100
0
99
96
94
80
80
80
431
94
121
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

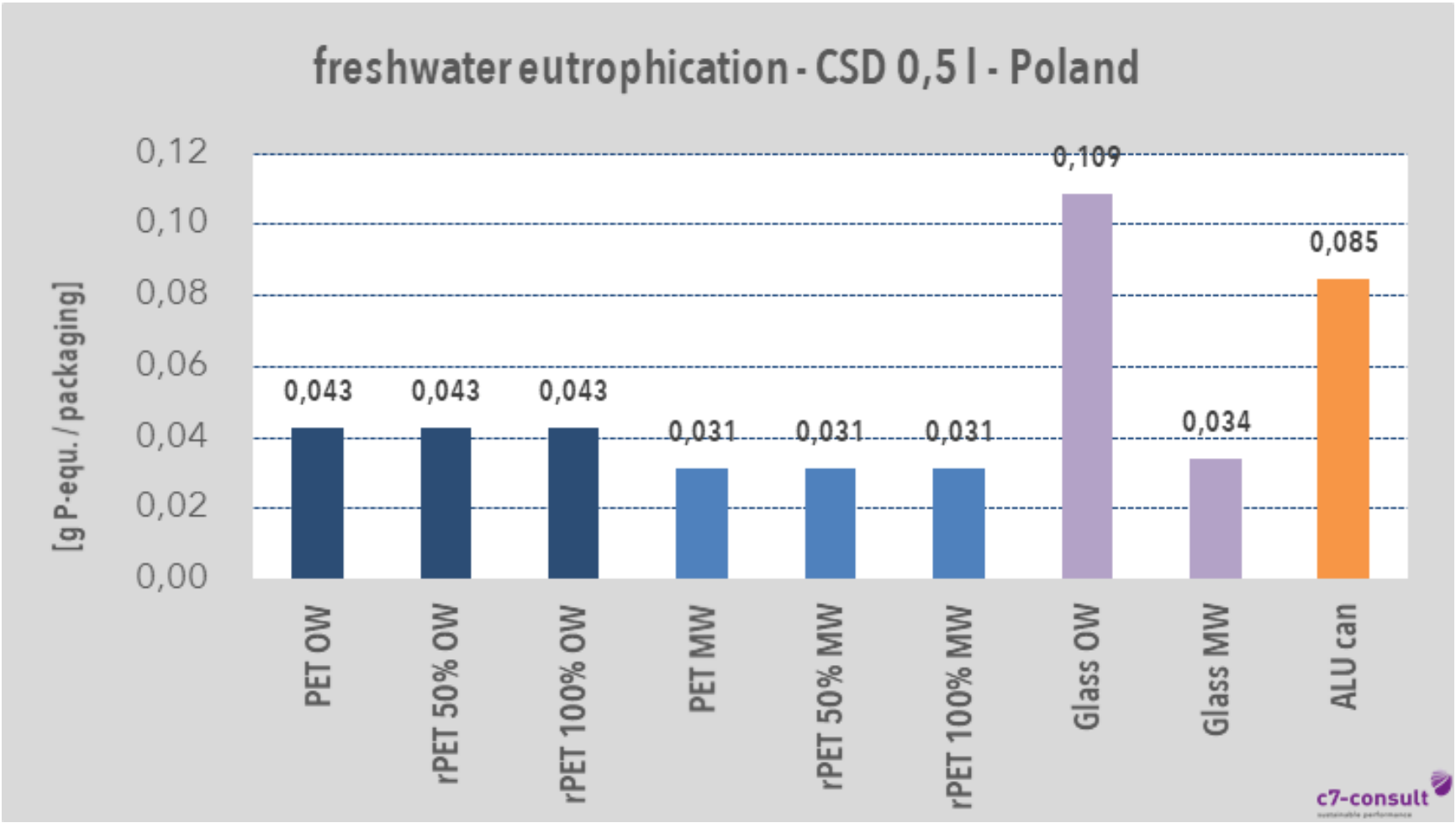
CSD


acidification potential - CSD 0,5 l - Poland
[g SO2-equ./ packaging]
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,32
0,31
0,31
0,28
0,28
0,28
2,98
0,43
0,66
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

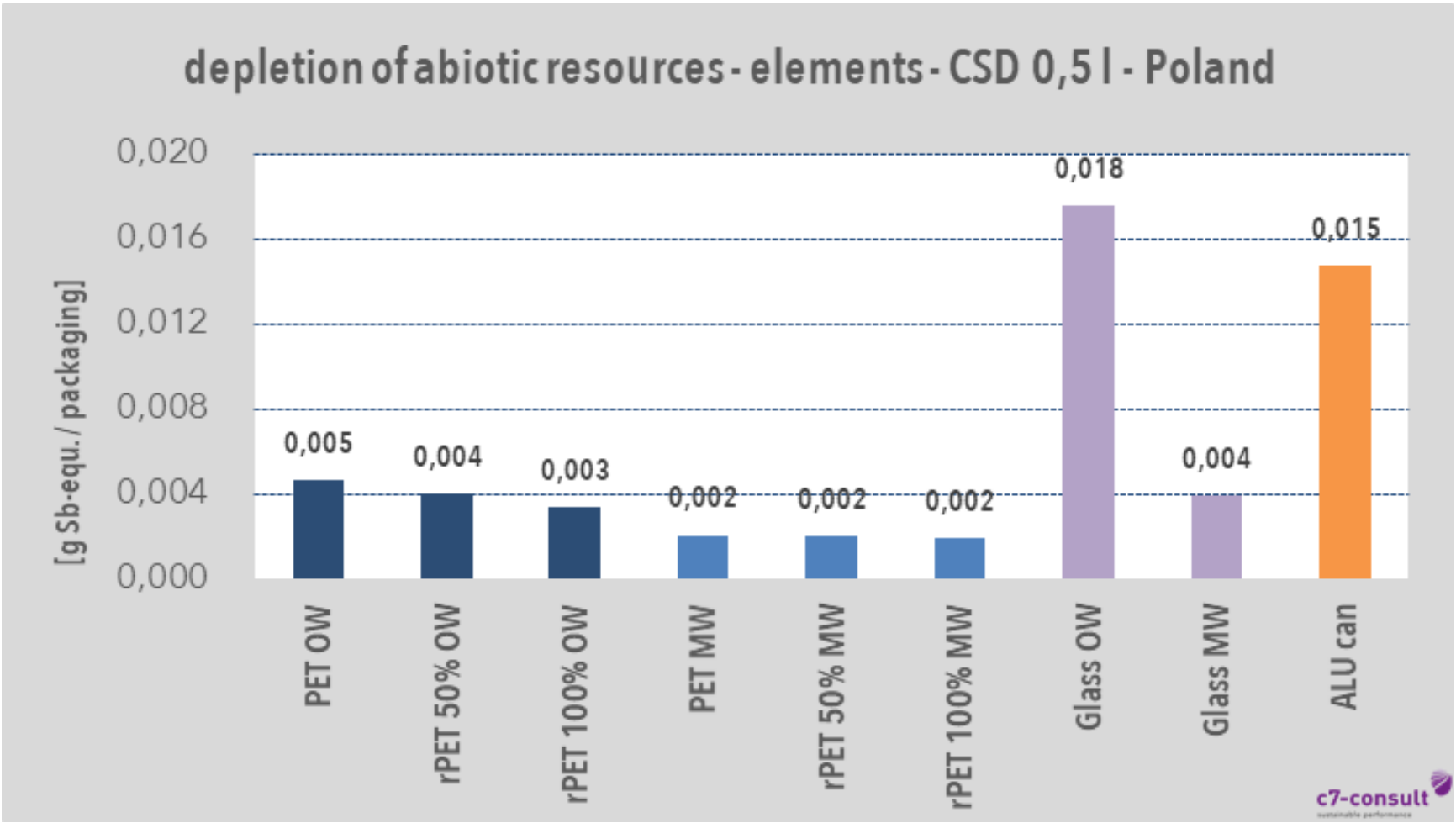
CSD


photochemical oxidation (summer smog) - CSD 0,5 l - Poland
[mg ethene-equ. / packaging]
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,016
0,016
0,016
0,014
0,014
0,014
0,124
0,022
0,046
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

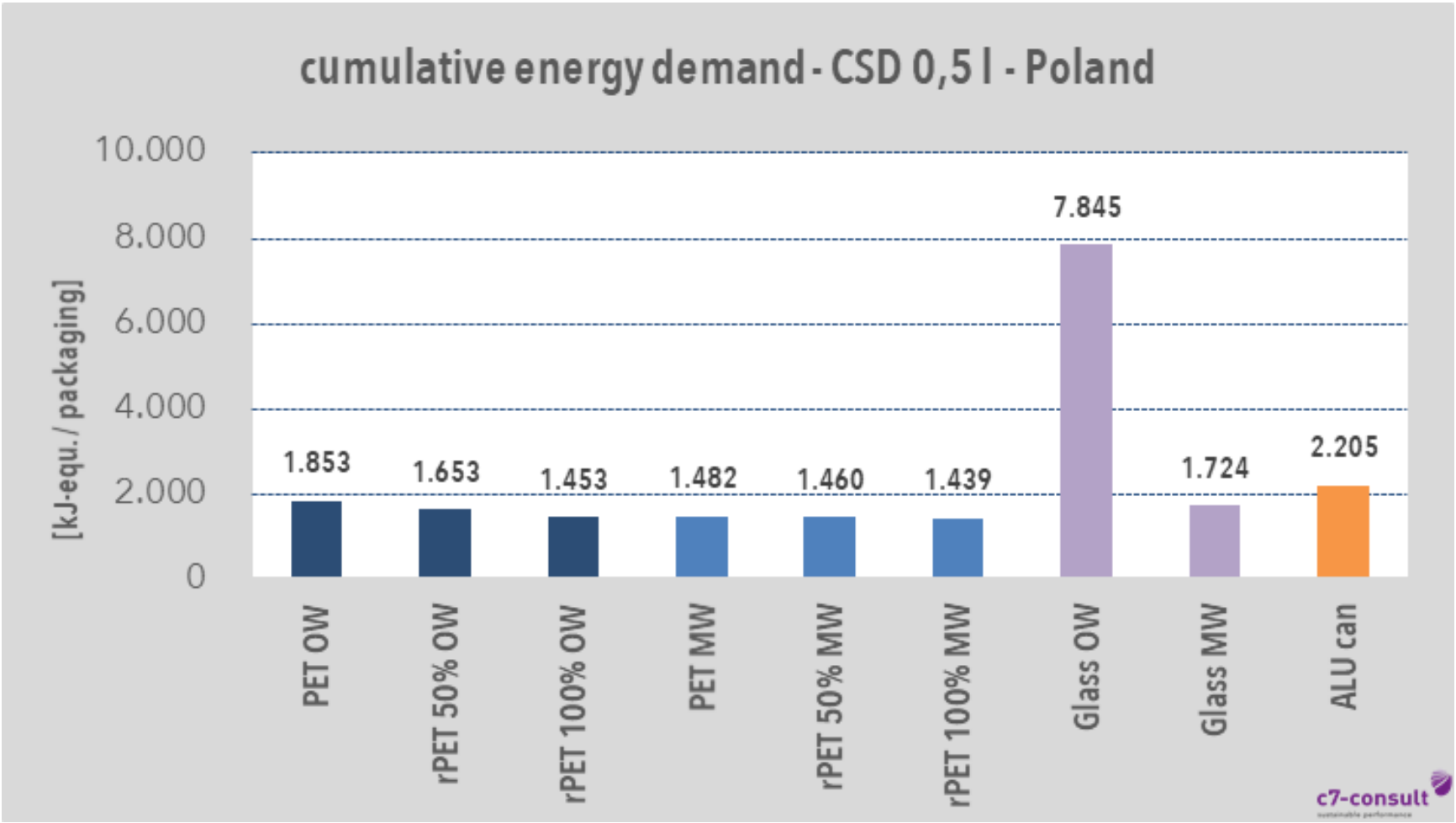
CSD


freshwater eutrophication - CSD 0,5 l - Poland
[g P-equ. / packaging]
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,043
0,043
0,043
0,031
0,031
0,031
0,109
0,034
0,085
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

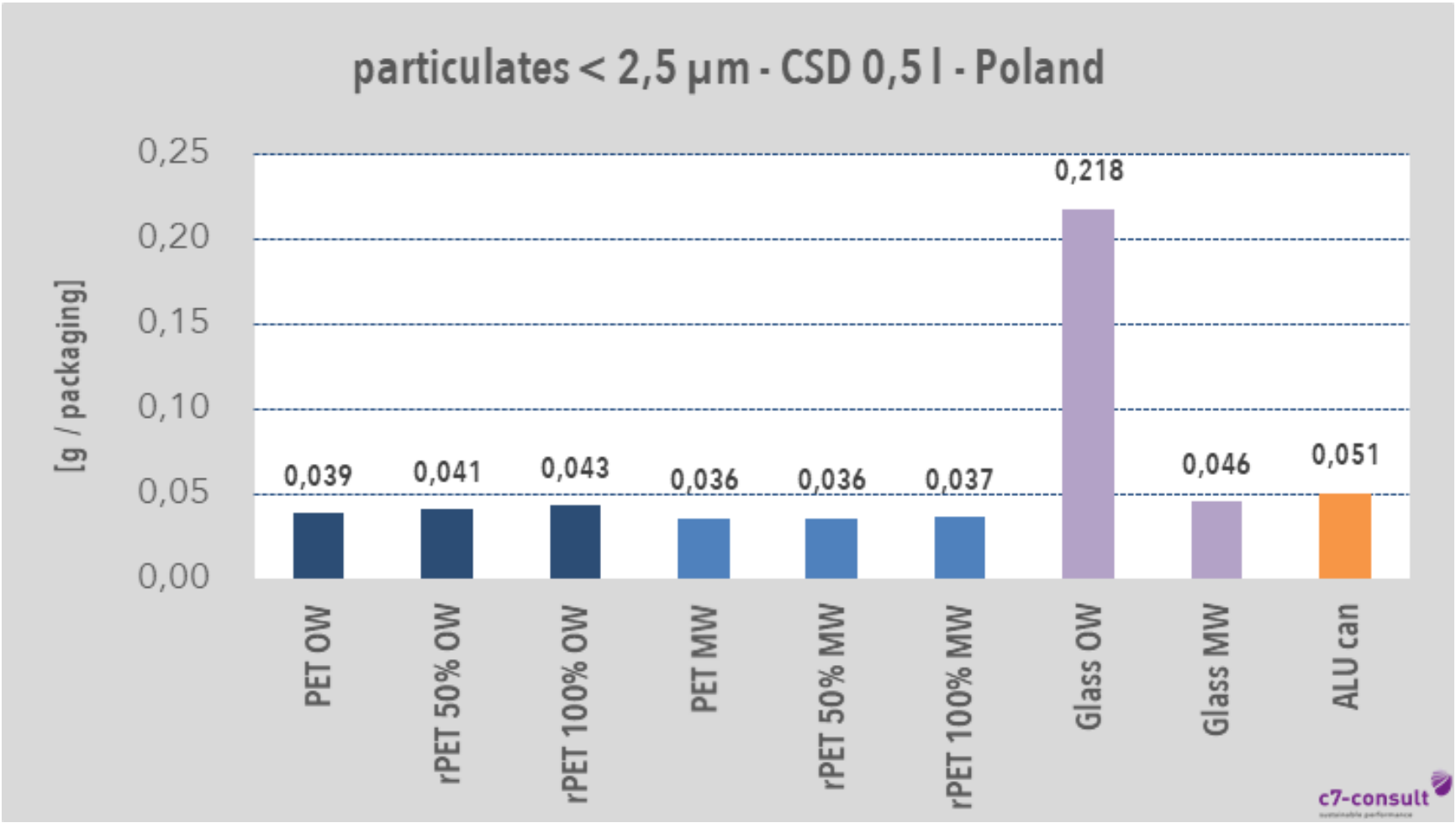
CSD


depletion of abiotic resources - elements - CSD 0,5 l - Poland
[g Sb-equ./ packaging]
0,020
0,016
0,012
0,008
0,004
0,000
0,005
0,004
0,003
0,002
0,002
0,002
0,018
0,004
0,015
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

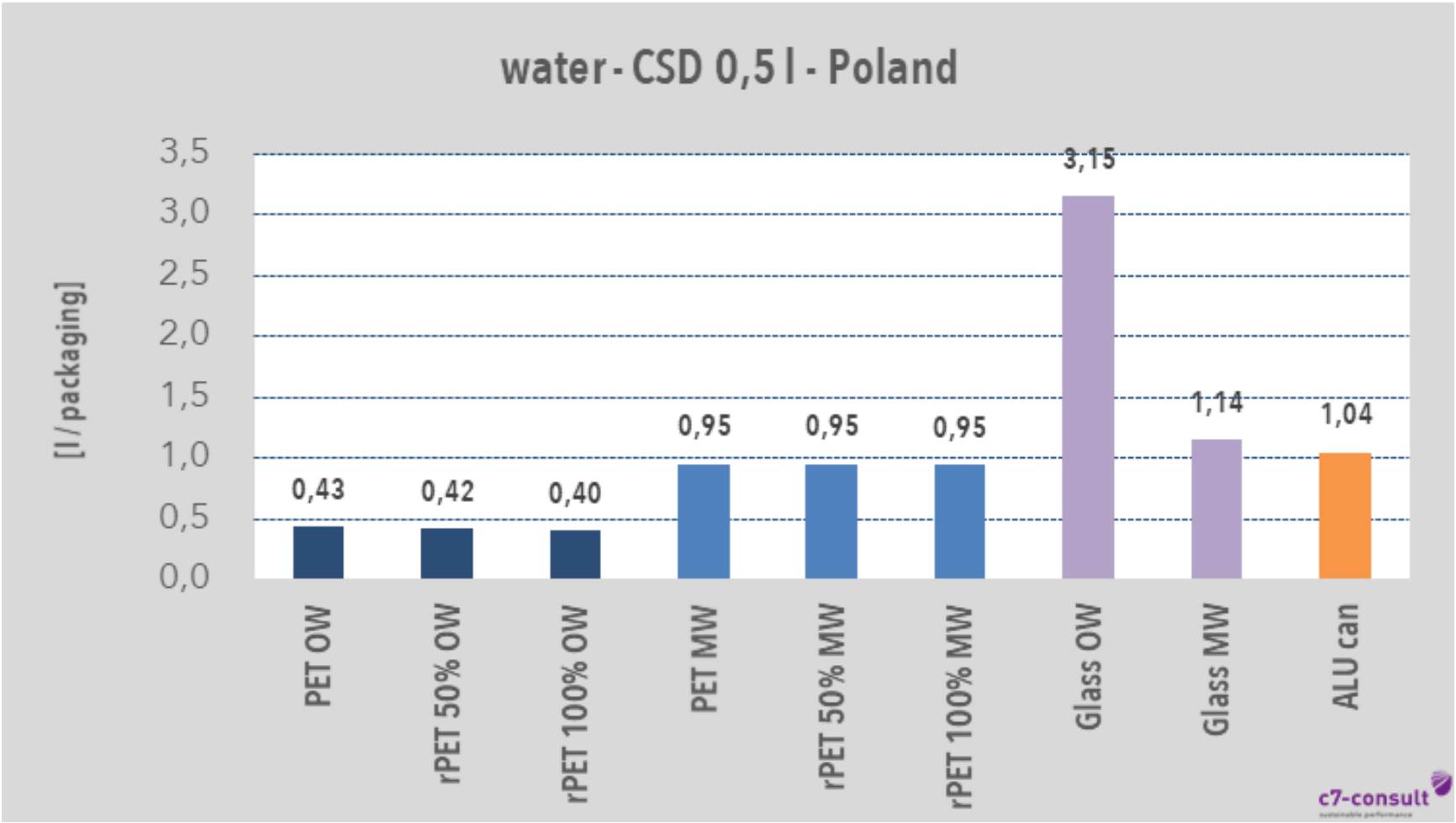
CSD


cumulative energy demand - CSD 0,5 l - Poland
[kJ-equ./ packaging]
10.000
8.000
6.000
4.000
2.000
0
1.853
1.653
1.453
1.482
1.460
1.439
7.845
1.724
2.205
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

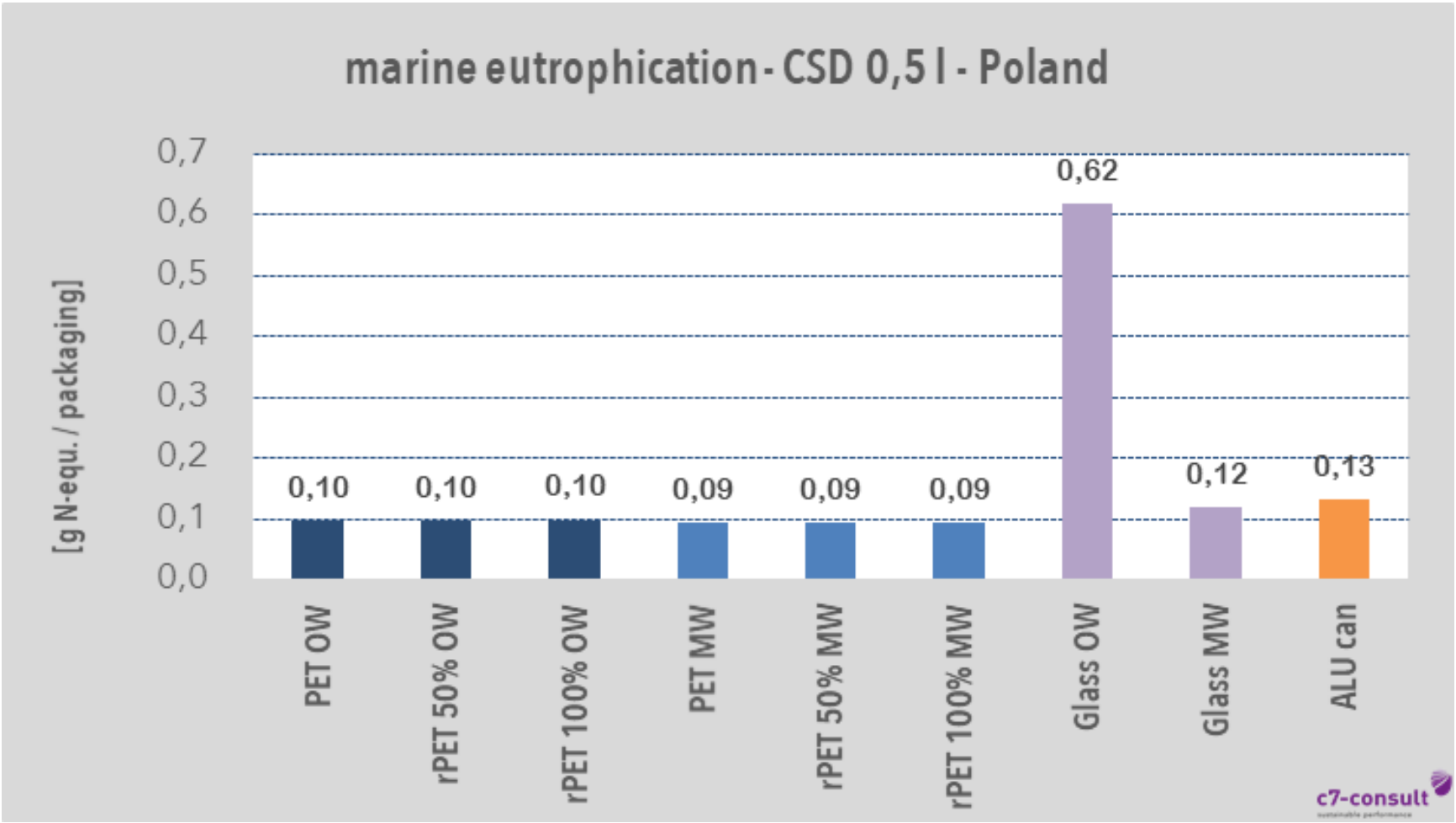
CSD


particulates < 2,5 µm - CSD 0,5 l - Poland
[g / packaging]
0,25
0,20
0,15
0,10
0,05
0,00
0,039
0,041
0,043
0,036
0,036
0,037
0,218
0,046
0,051
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

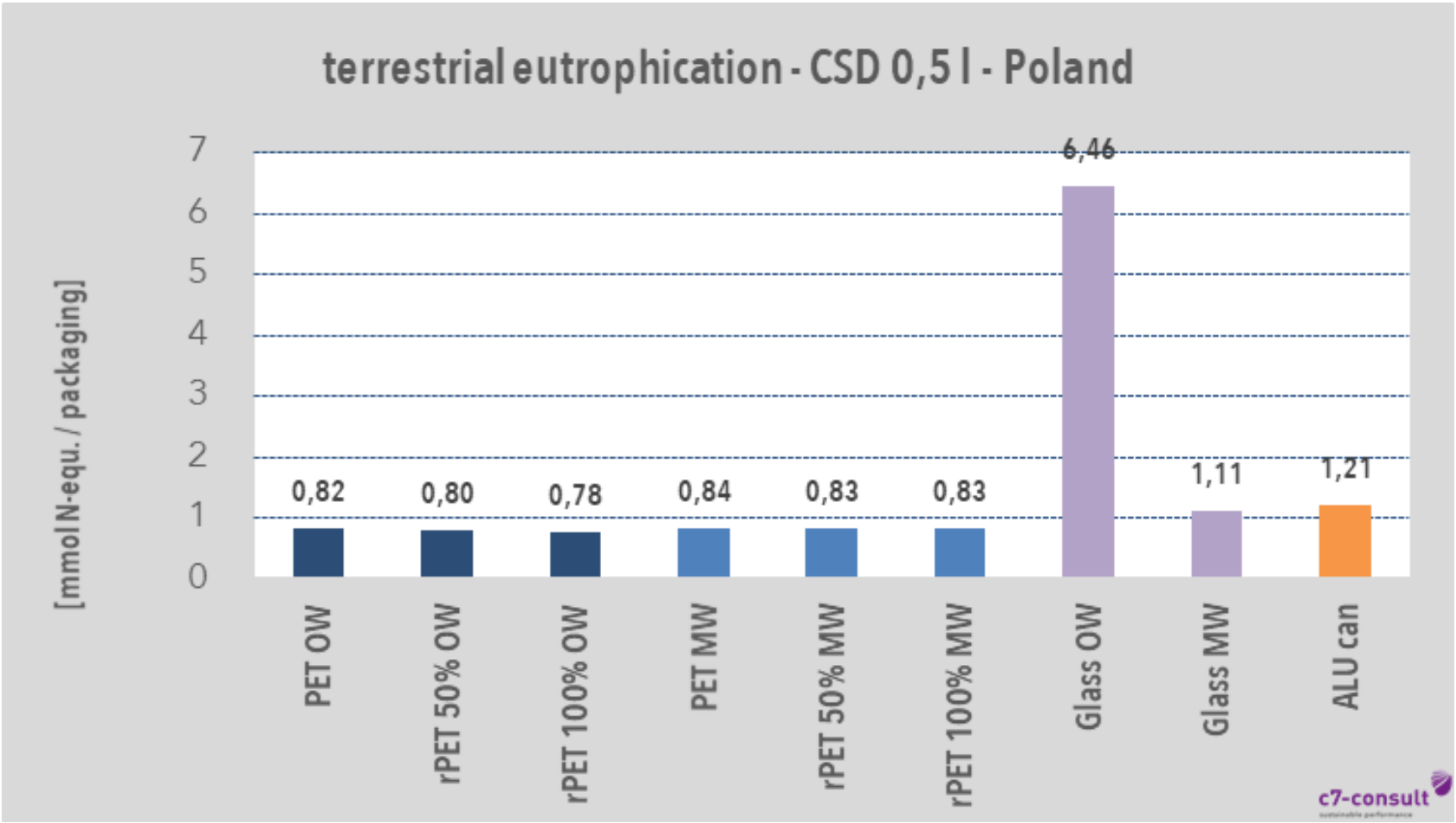
CSD


water - CSD 0,5 l - Poland
[l / packaging]
3,5
3,0
2,5
2,0
1,5
1,0
0,5
0,0
0,43
0,42
0,40
0,95
0,95
0,95
3,15
1,14
1,04
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

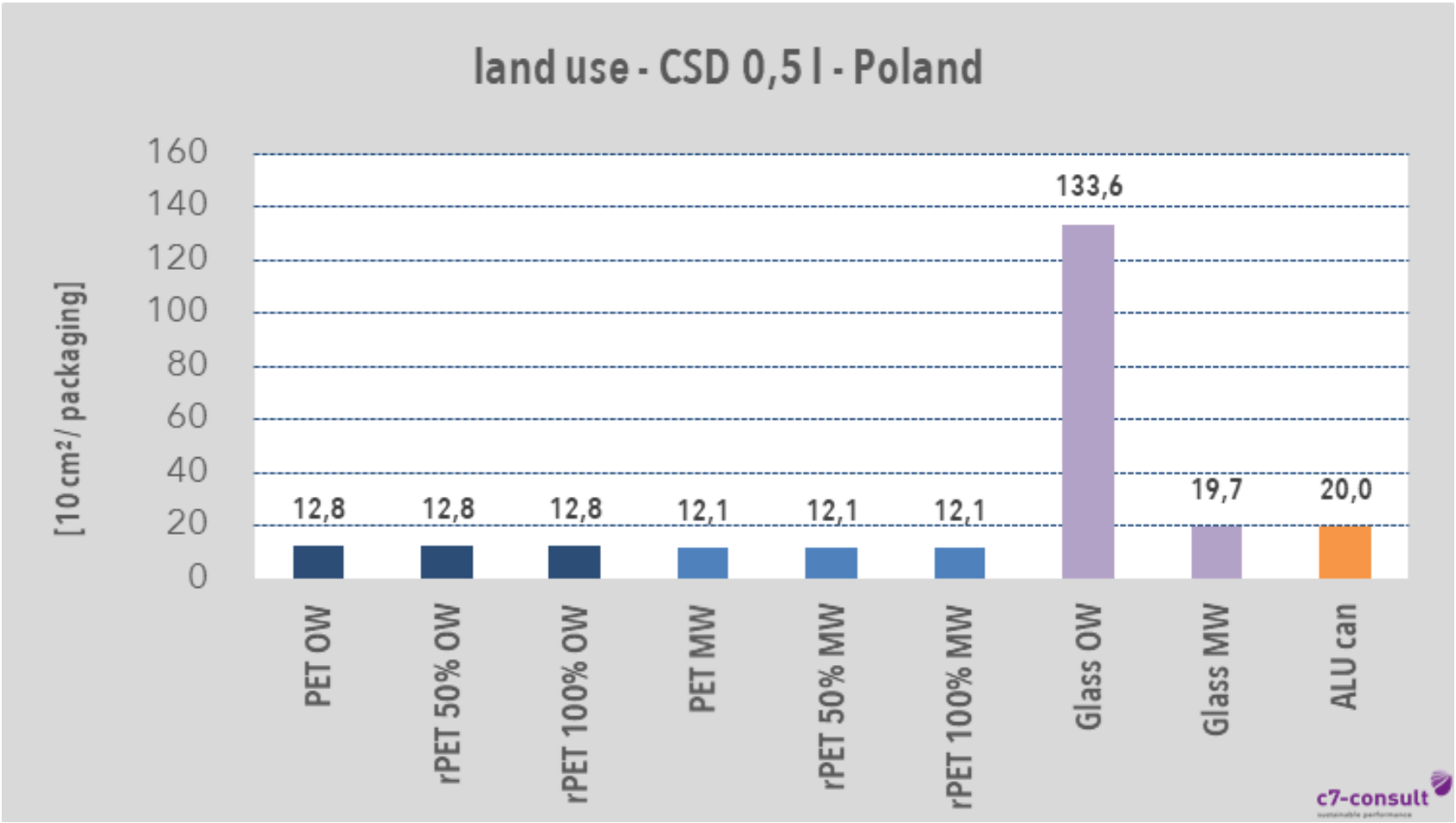
CSD


marine eutrophication - CSD 0,5 l - Poland
[g N-equ. / packaging]
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,0
0,10
0,10
0,10
0,09
0,09
0,09
0,62
0,12
0,13
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

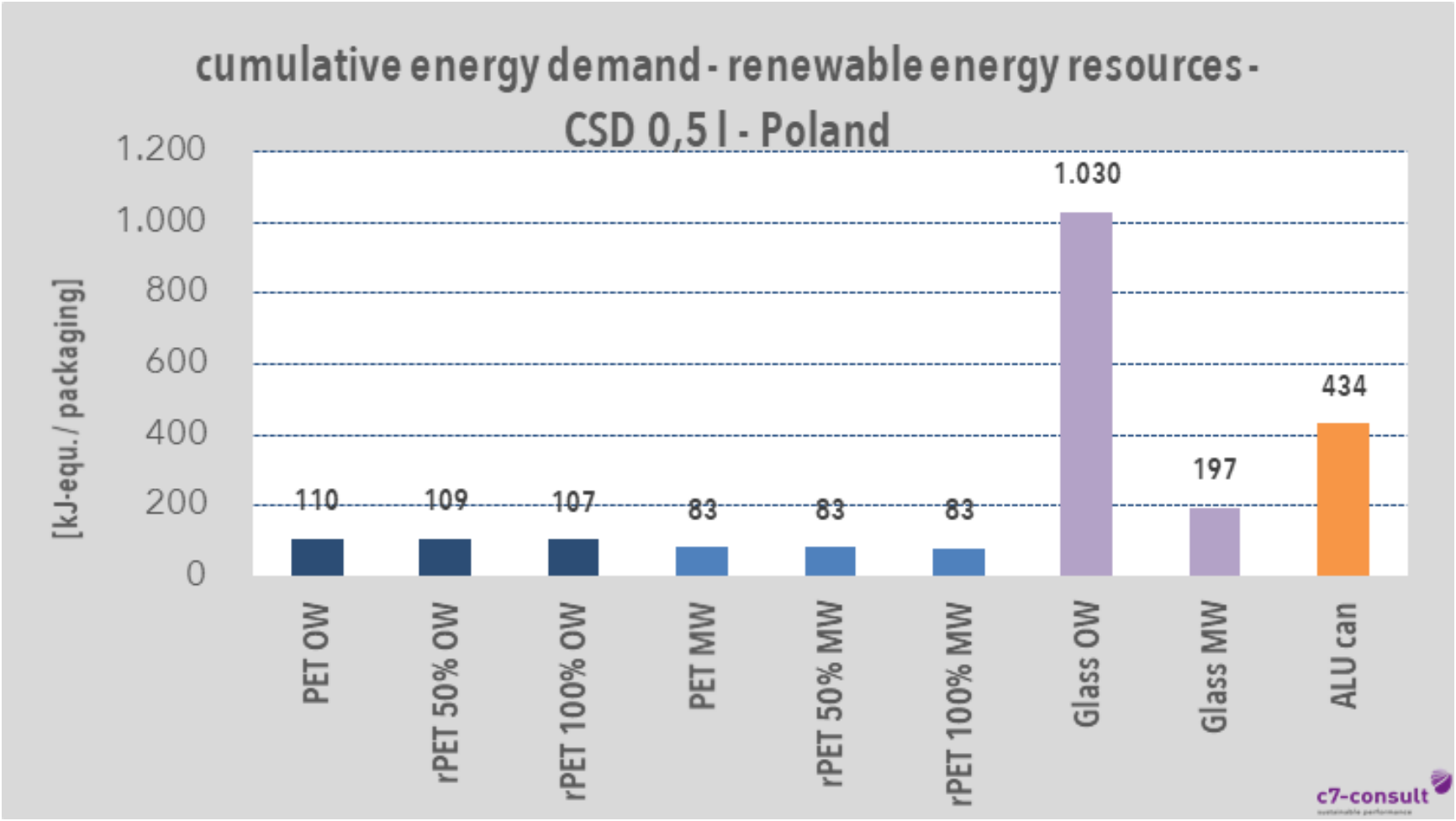
CSD


terrestrial eutrophication - CSD 0,5 l - Poland
[mmol N-equ. / packaging]
0
1
2
3
4
5
6
7
0,82
0,80
0,78
0,84
0,83
0,83
6,46
1,11
1,21
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

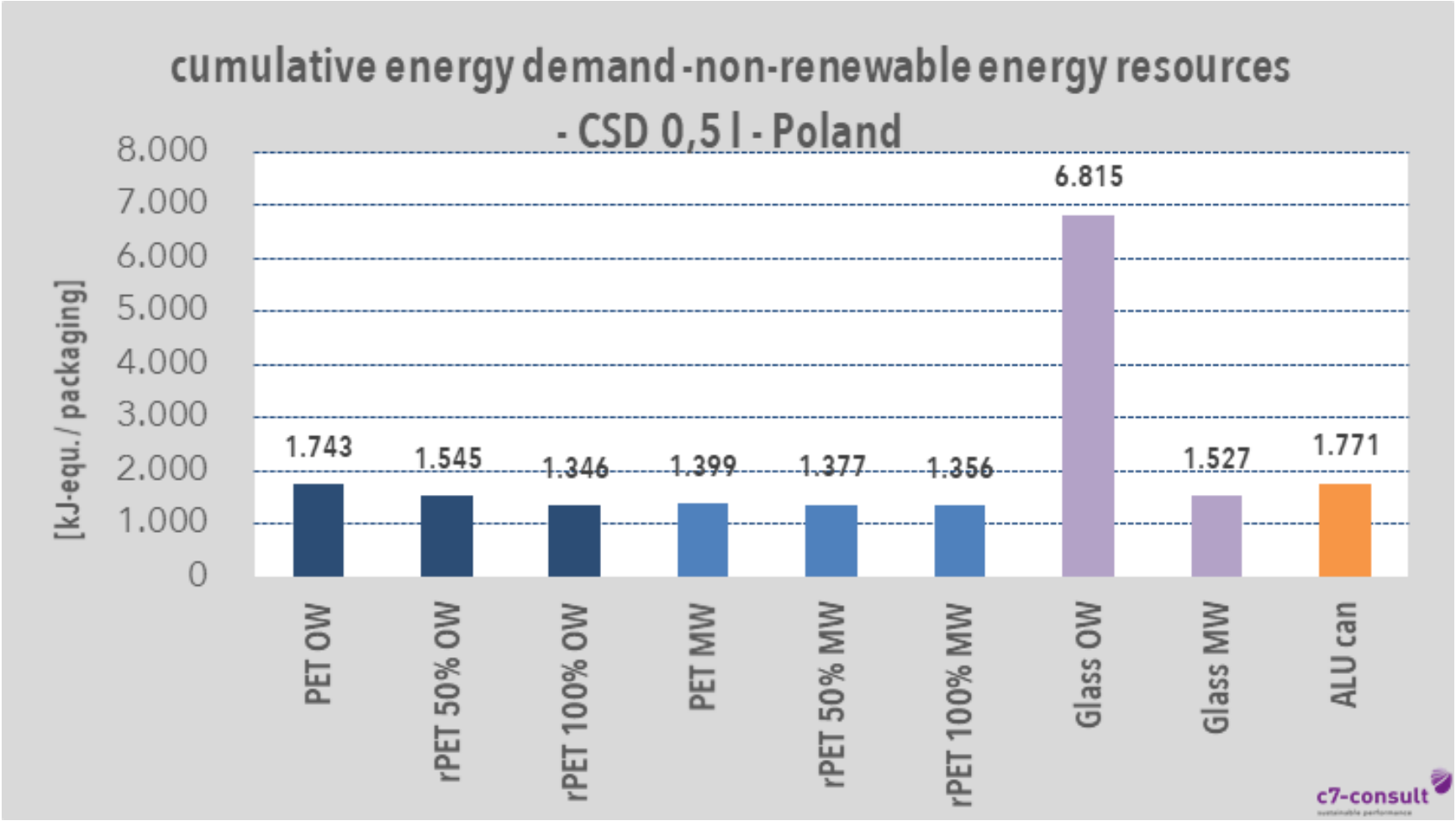
CSD


land use - CSD 0,5 l - Poland
[10 cm²/ packaging]
160
140
120
100
80
60
40
20
0
12,8
12,8
12,8
12,1
12,1
12,1
133,6
19,7
20,0
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

CSD


cumulative energy demand - renewable energy resources -
CSD 0,5 l - Poland
[kJ-equ./ packaging]
1.200
1.000
800
600
400
200
0
110
109
107
83
83
83
1.030
197
434
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

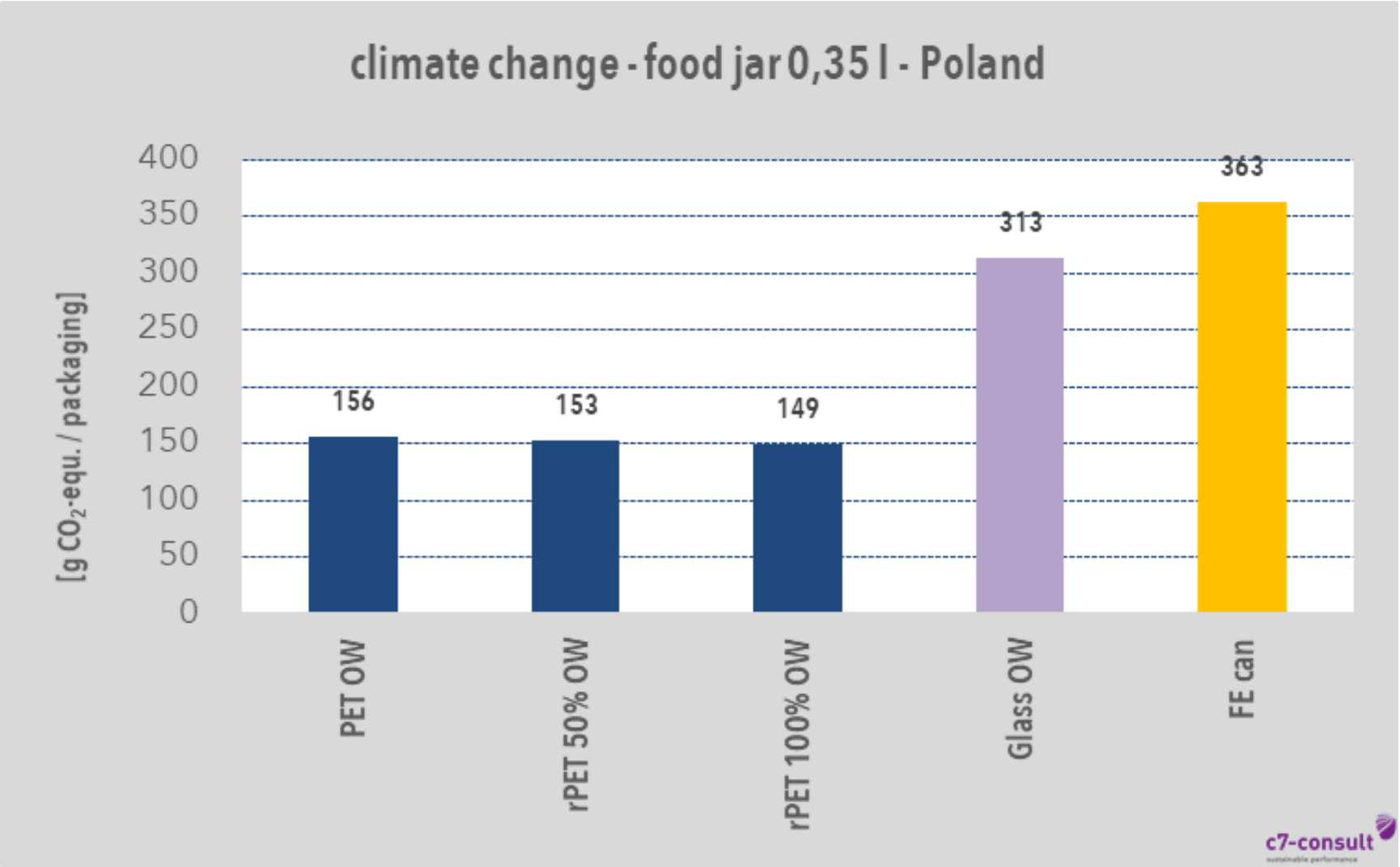
CSD


cumulative energy demand -non-renewable energy resources
- CSD 0,5 l - Poland
[kJ-equ./ packaging]
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0
1.743
1.545
1.346
1.399
1.377
1.356
6.815
1.527
1.771
PET OW
rPET 50% OW
rPET 100% OW
PET MW
rPET 50% MW
rPET 100% MW
Glass OW
Glass MW
ALU can
c7-consult

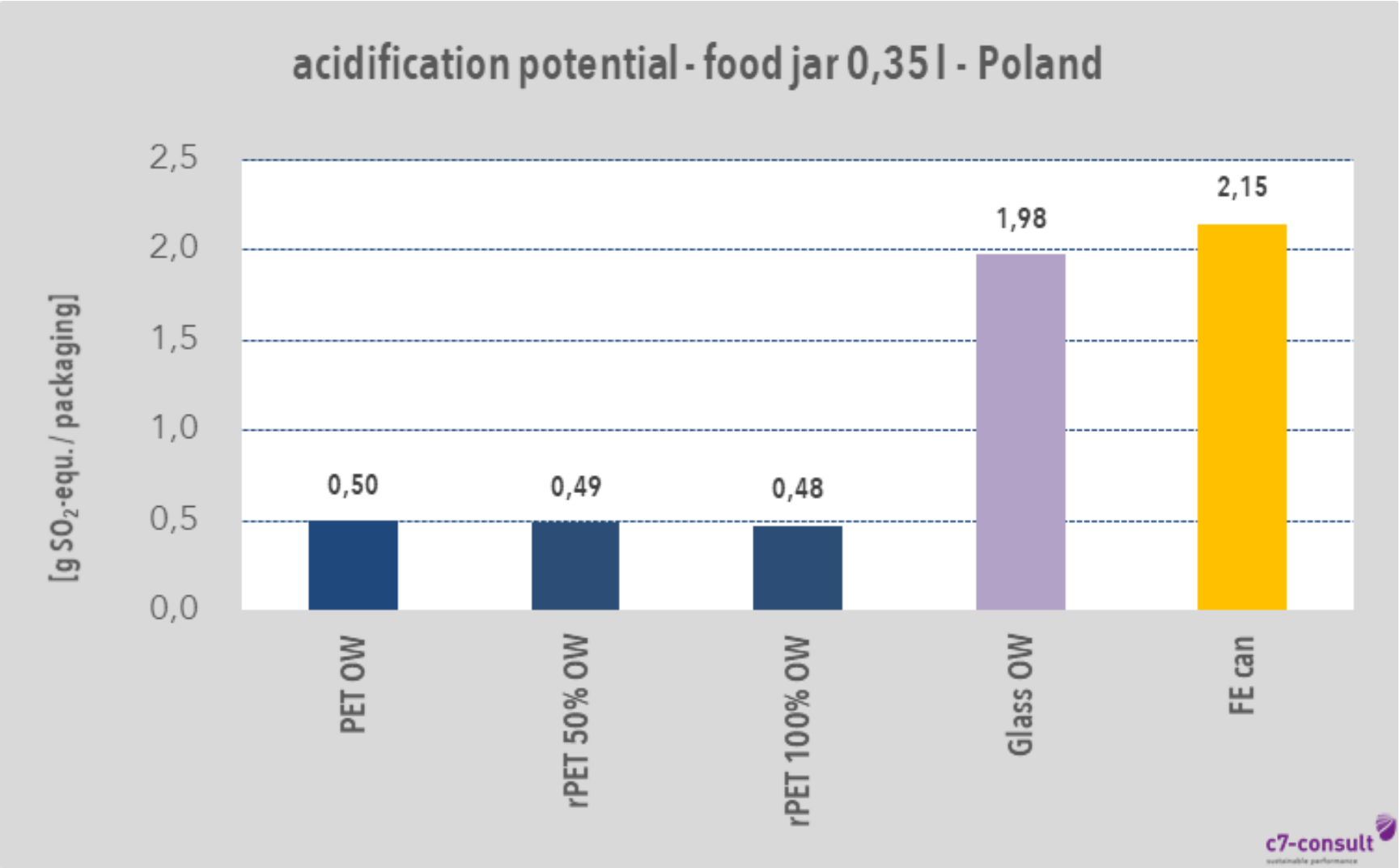
c7-consult
sustainable performance

Results Food 350 g

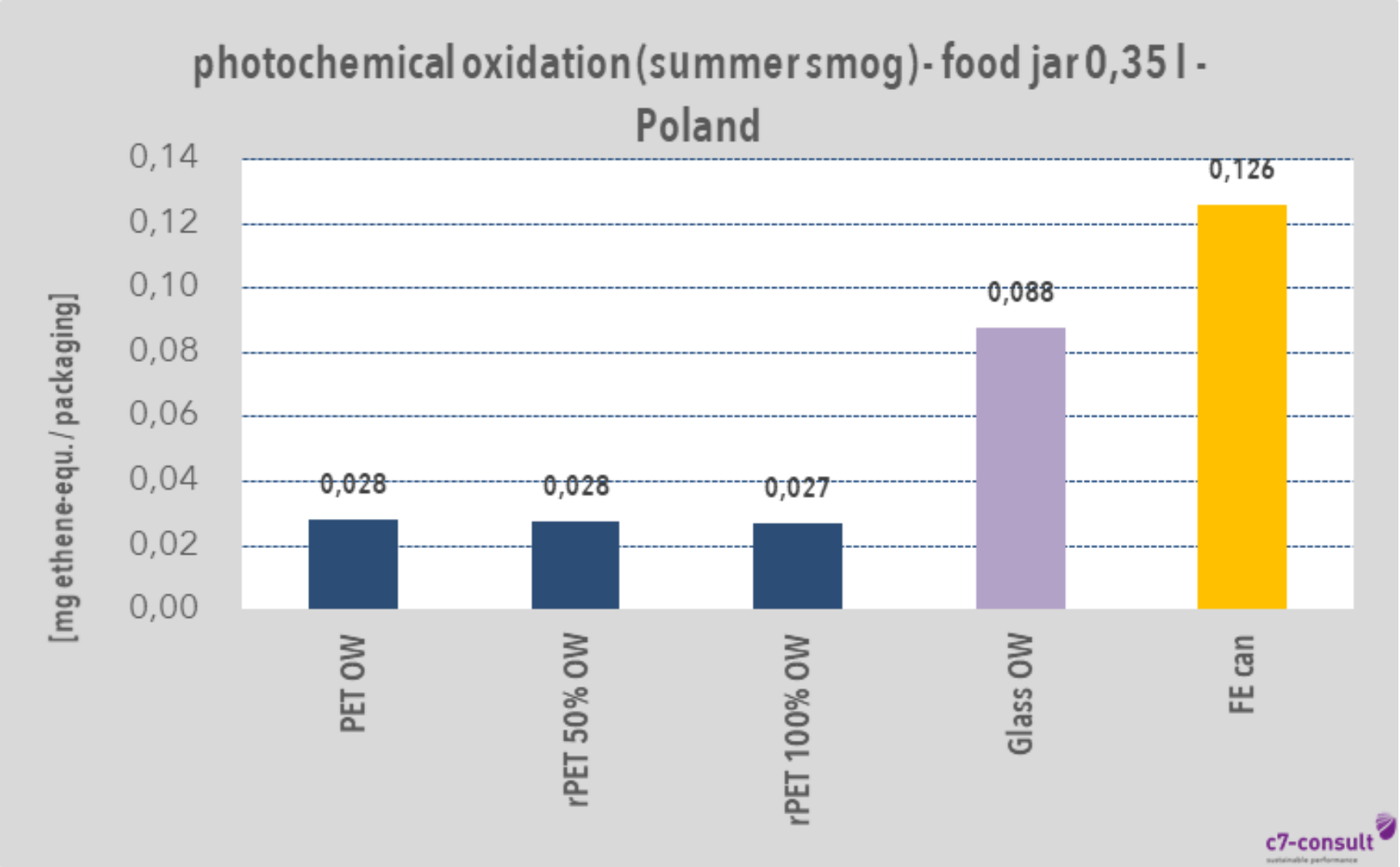
Food


climate change - food jar 0,35 l - Poland
[g CO_2-equ. / packaging]
400
350
300
250
200
150
100
50
0
156
153
149
313
363
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

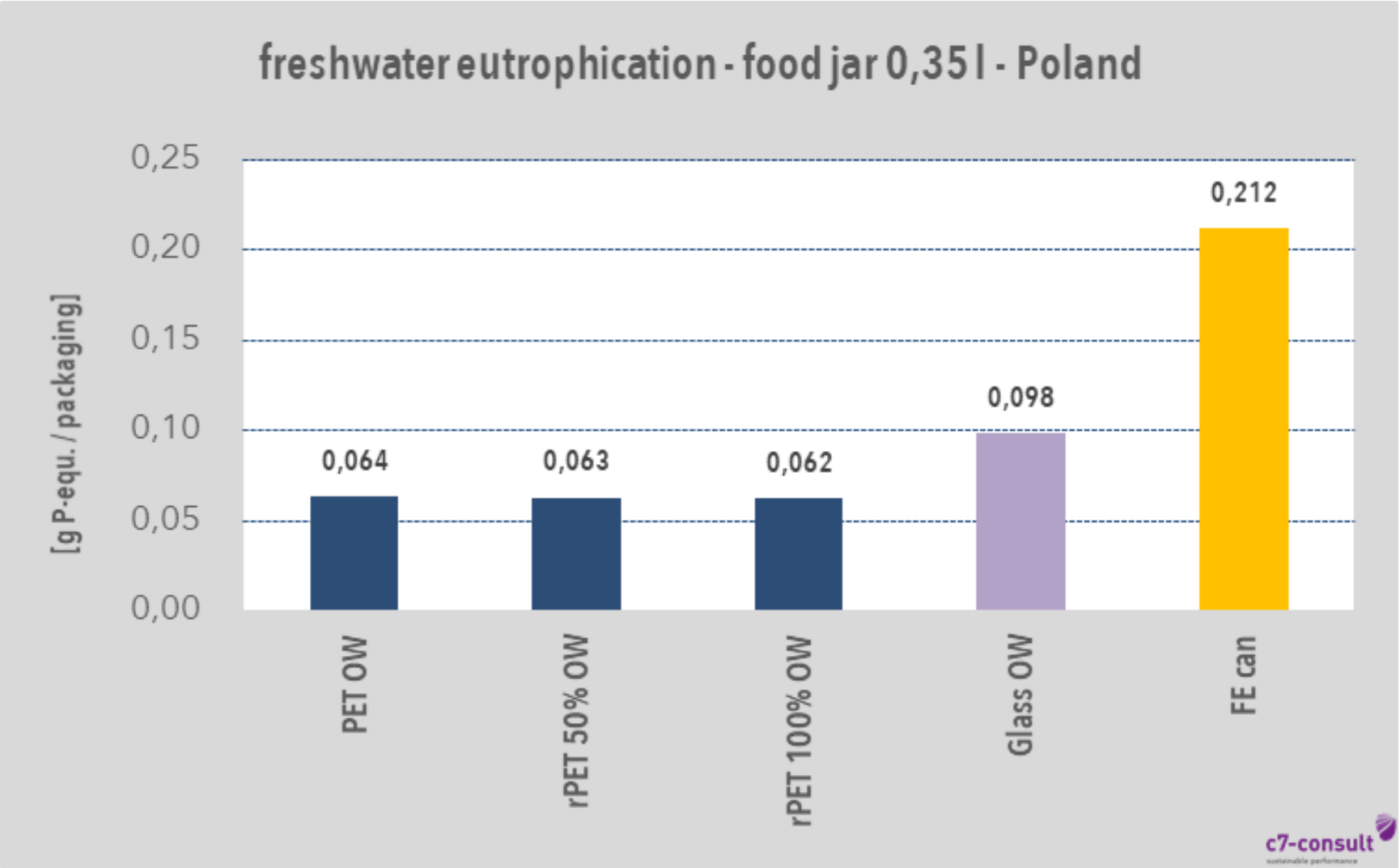
Food


acidification potential - food jar 0,35 l - Poland
[g SO2-equ. / packaging]
2,5
2,0
1,5
1,0
0,5
0,0
0,50
0,49
0,48
1,98
2,15
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

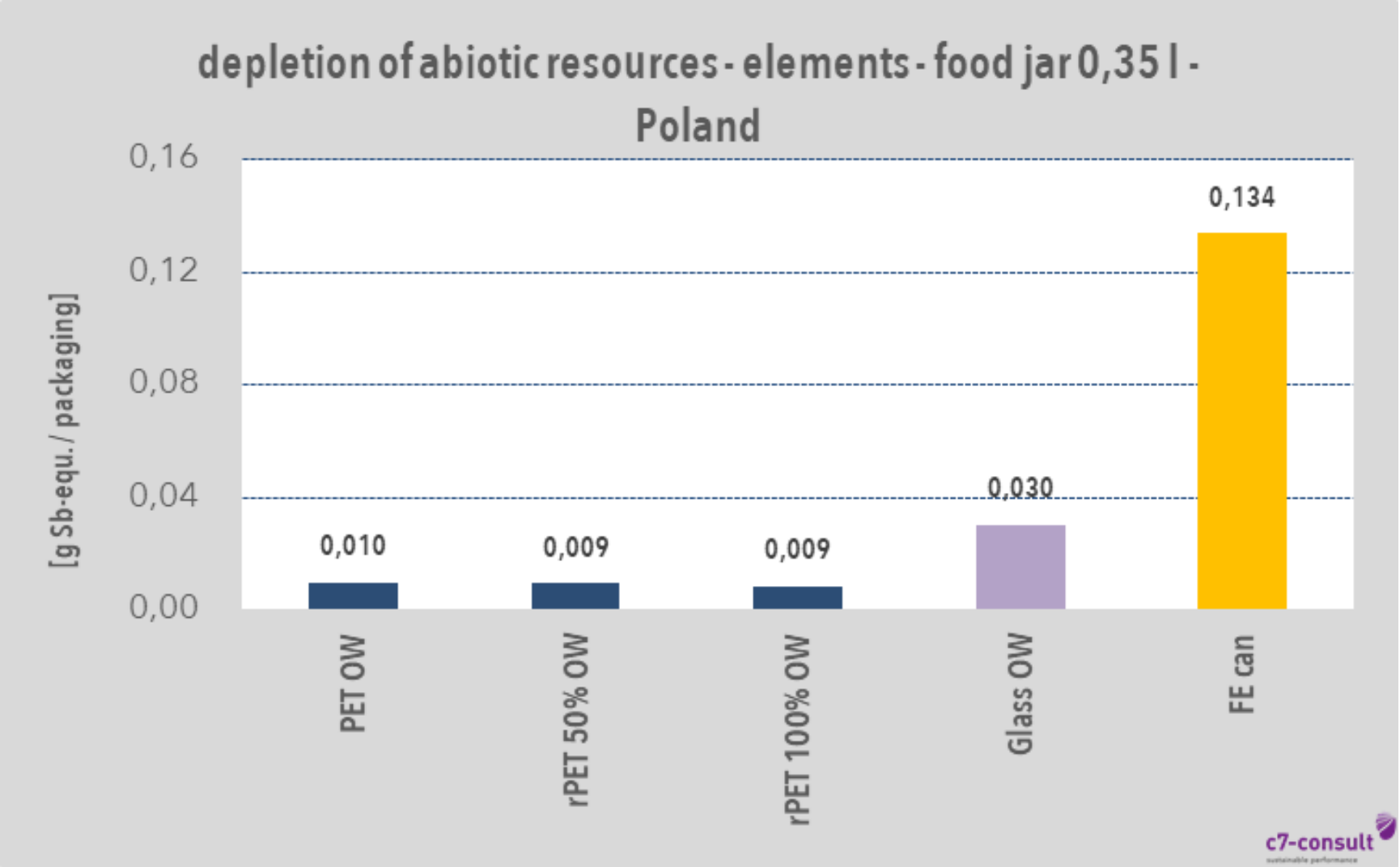
Food


photochemical oxidation (summer smog) - food jar 0,35 l - Poland
[mg ethene-equ. / packaging]
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,028
0,028
0,027
0,088
0,126
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can

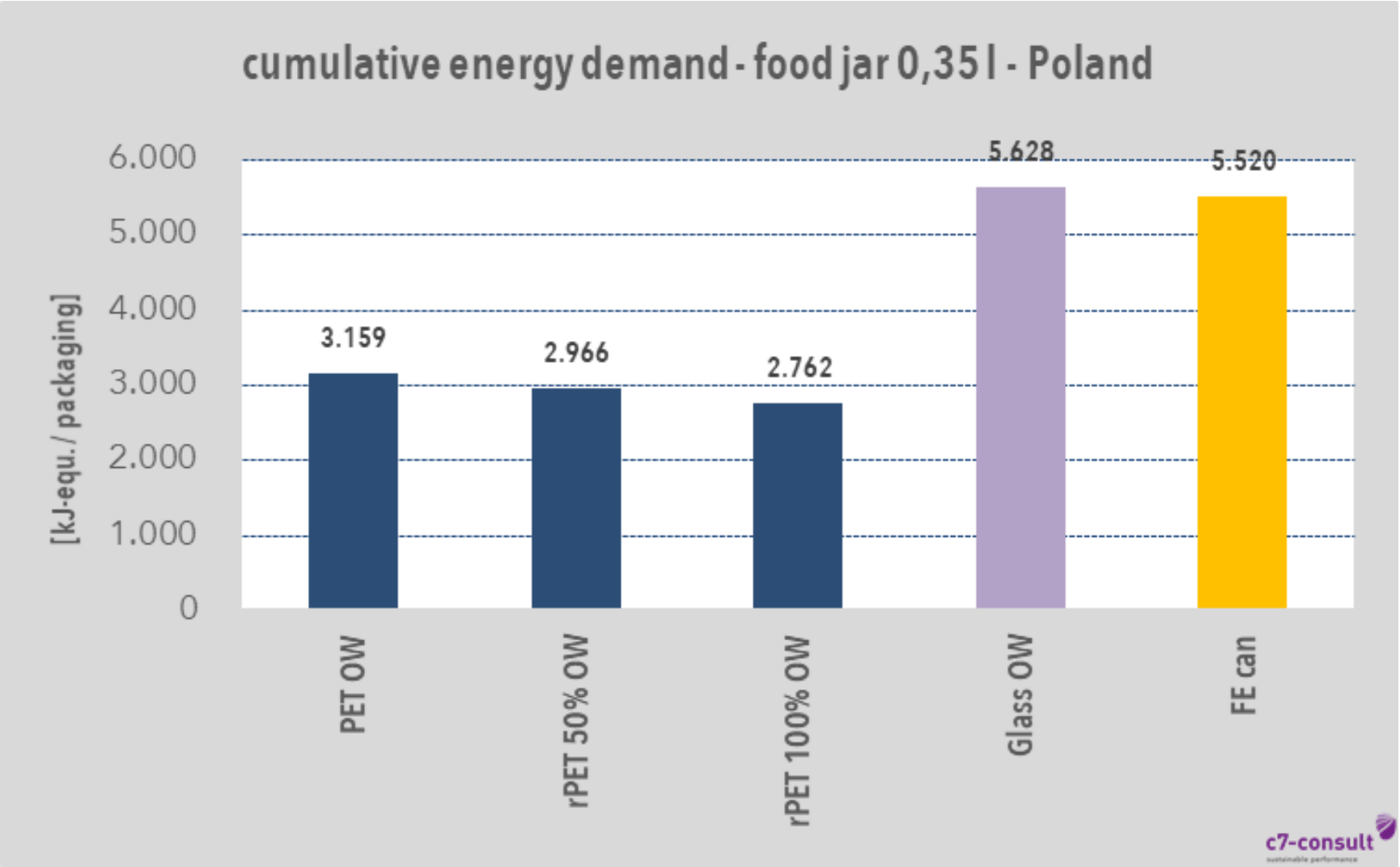
Food


freshwater eutrophication - food jar 0,35 l - Poland
[g P-equ. / packaging]
0,25
0,20
0,15
0,10
0,05
0,00
0,064
0,063
0,062
0,098
0,212
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

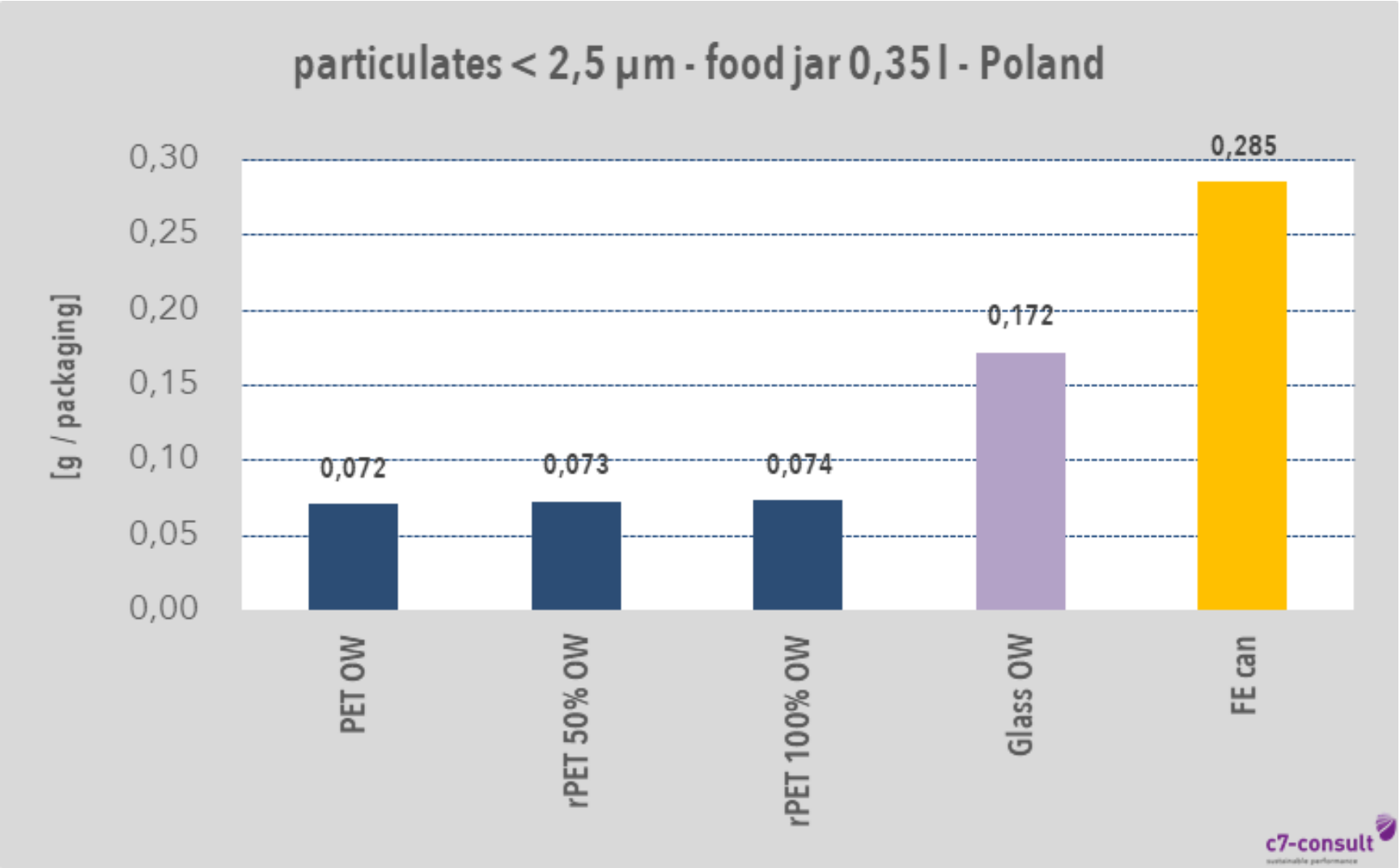
Food


depletion of abiotic resources - elements - food jar 0,35 l - Poland
[g Sb-equ. / packaging]
0,16
0,12
0,08
0,04
0,00
0,010
0,009
0,009
0,030
0,134
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

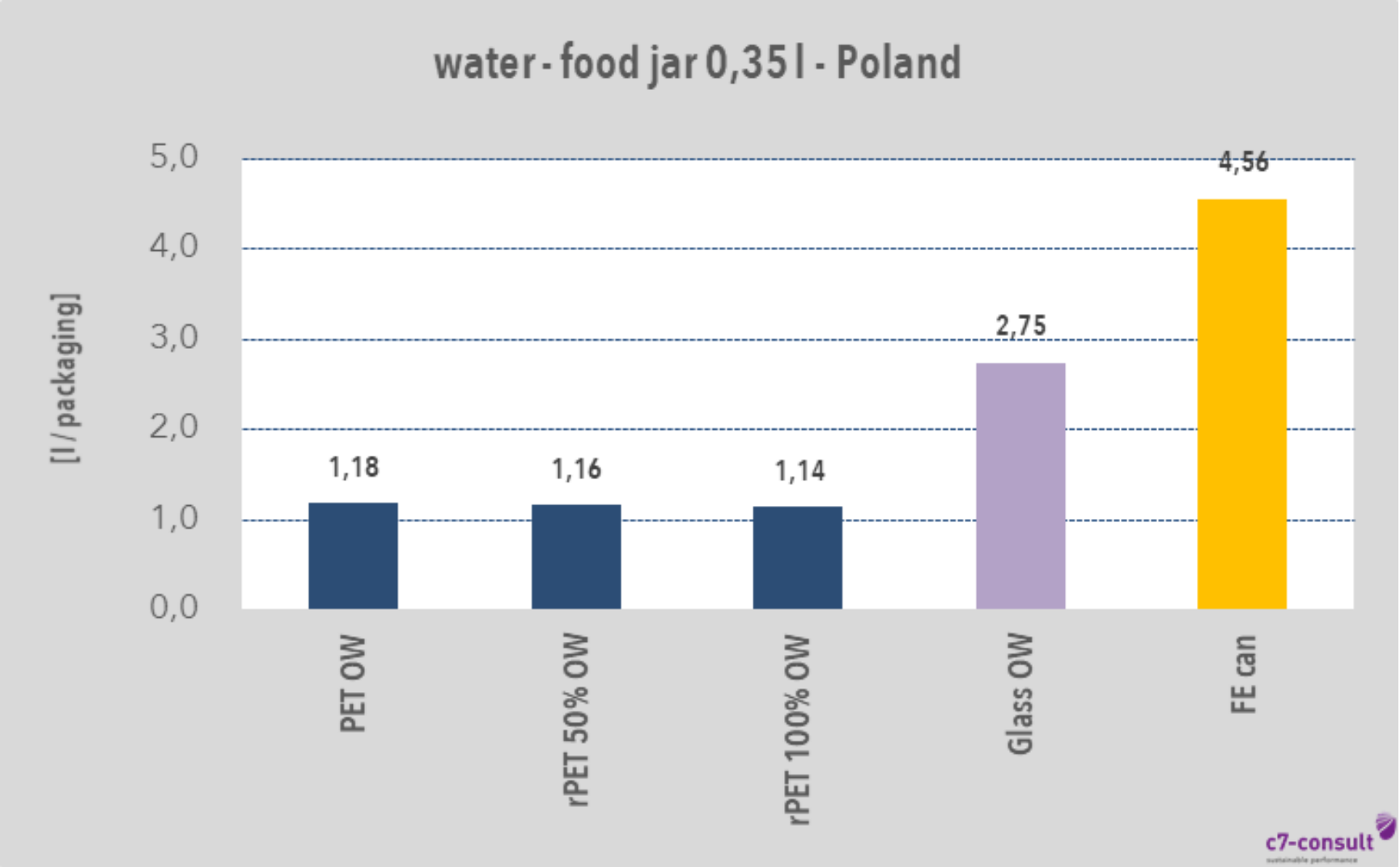
Food


cumulative energy demand - food jar 0,35 l - Poland
[kJ-equ./ packaging]
6.000
5.000
4.000
3.000
2.000
1.000
0
3.159
2.966
2.762
5.628
5.520
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

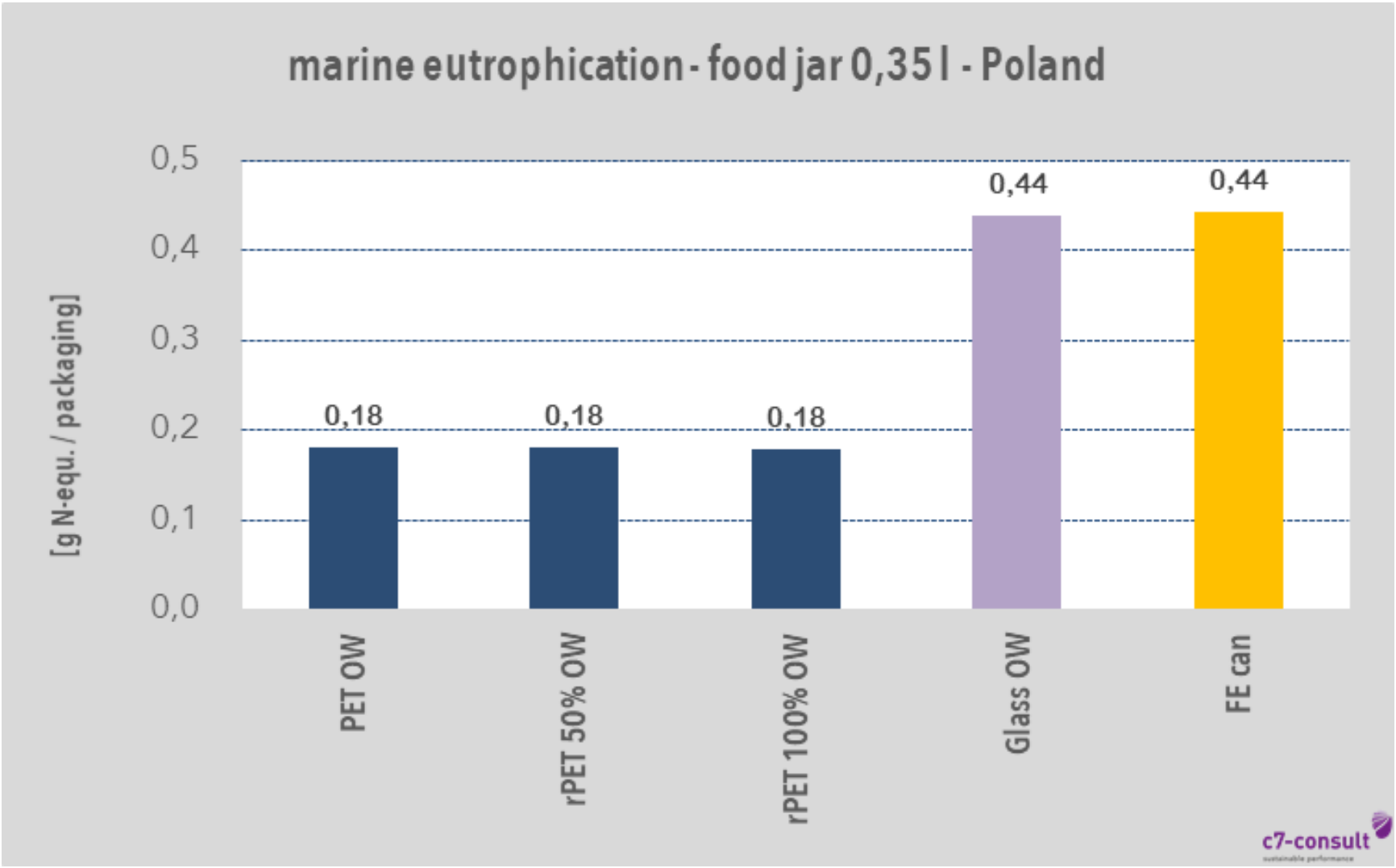
Food


particulates < 2,5 µm - food jar 0,35 l - Poland
[g / packaging]
0,30
0,25
0,20
0,15
0,10
0,05
0,00
0,072
0,073
0,074
0,172
0,285
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

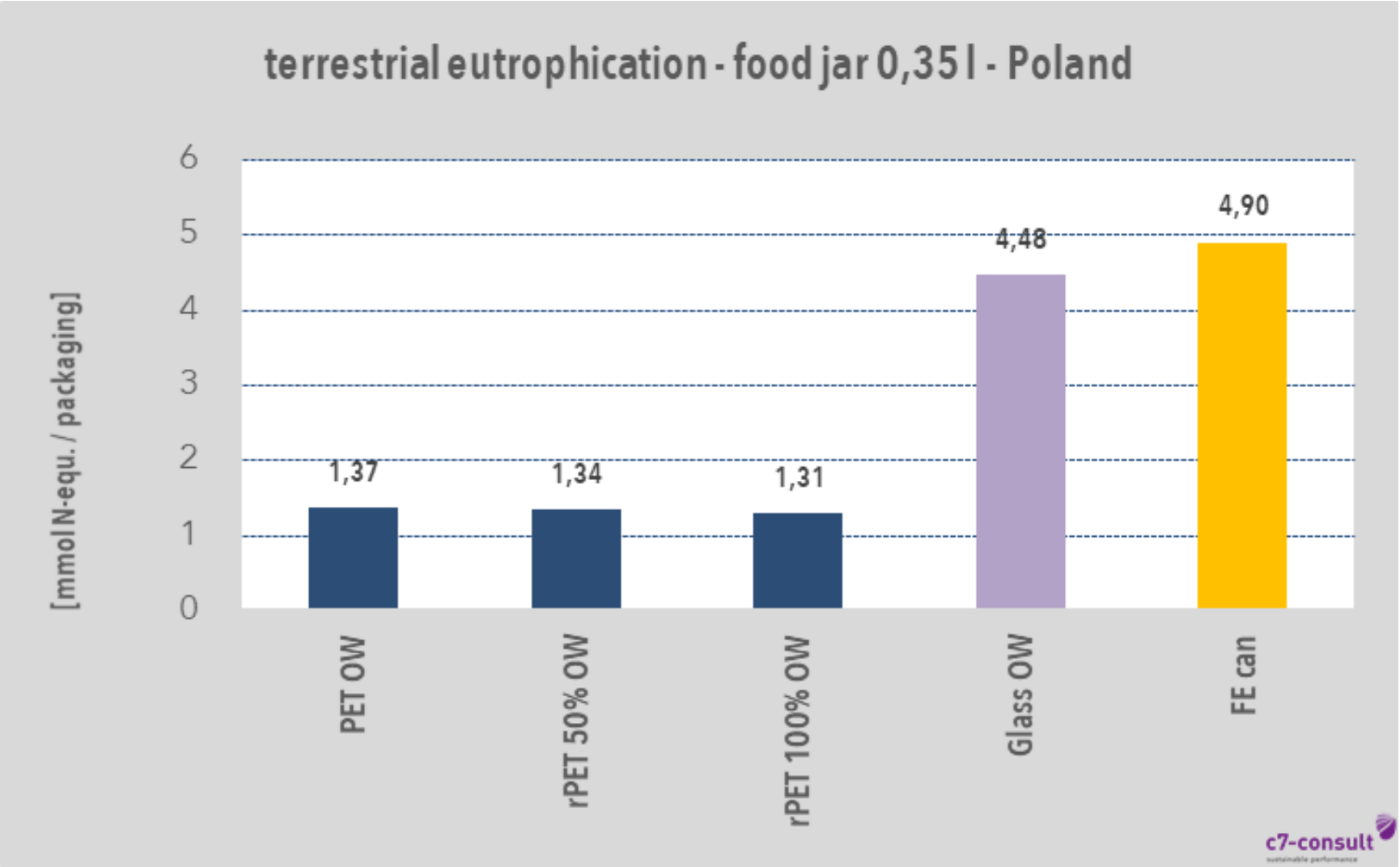
Food


water - food jar 0,35 l - Poland
[l / packaging]
5,0
4,0
3,0
2,0
1,0
0,0
1,18
1,16
1,14
2,75
4,56
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

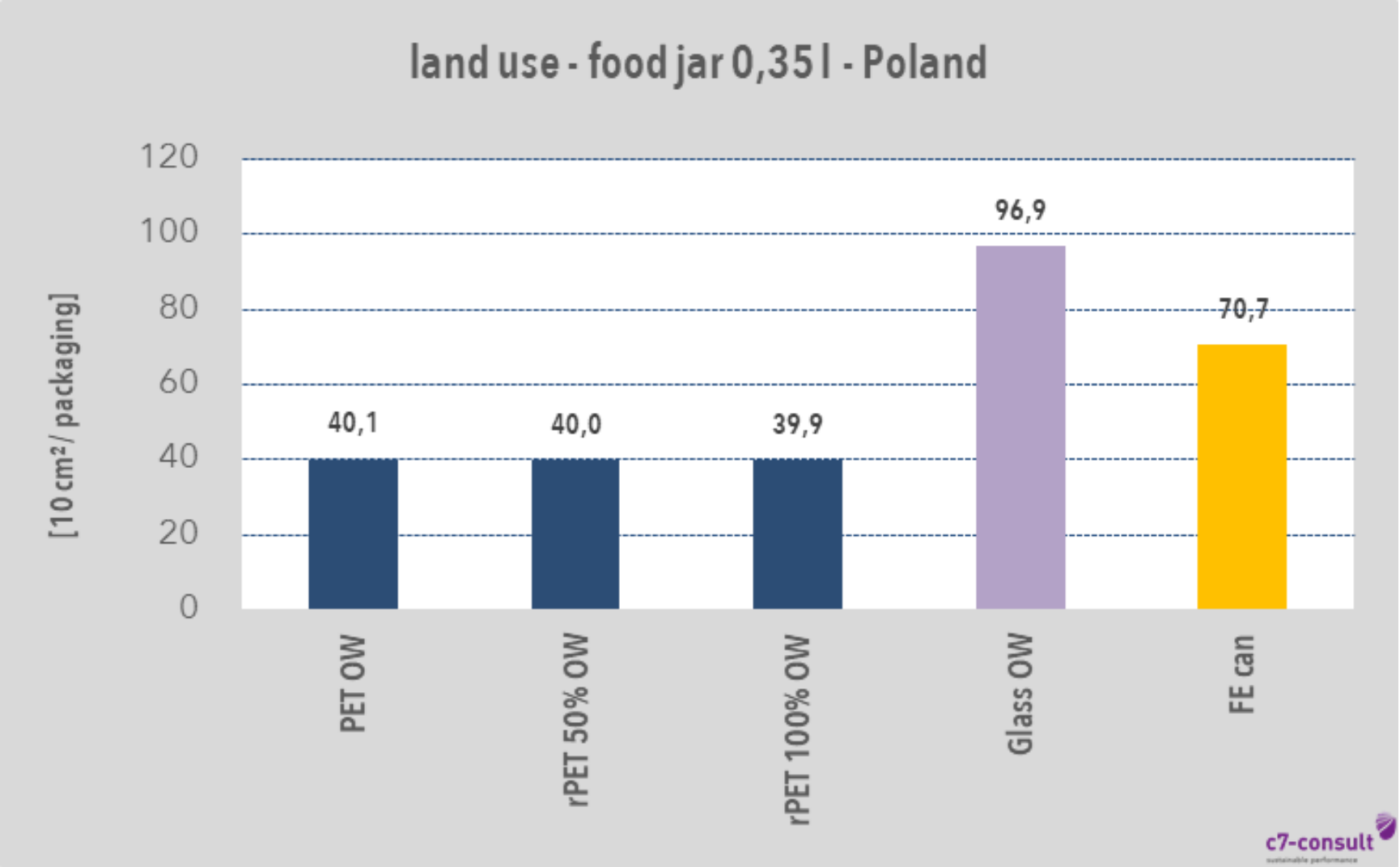
Food


marine eutrophication - food jar 0,35 l - Poland
[g N-equ. / packaging]
0,5
0,4
0,3
0,2
0,1
0,0
0,18
0,18
0,18
0,44
0,44
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

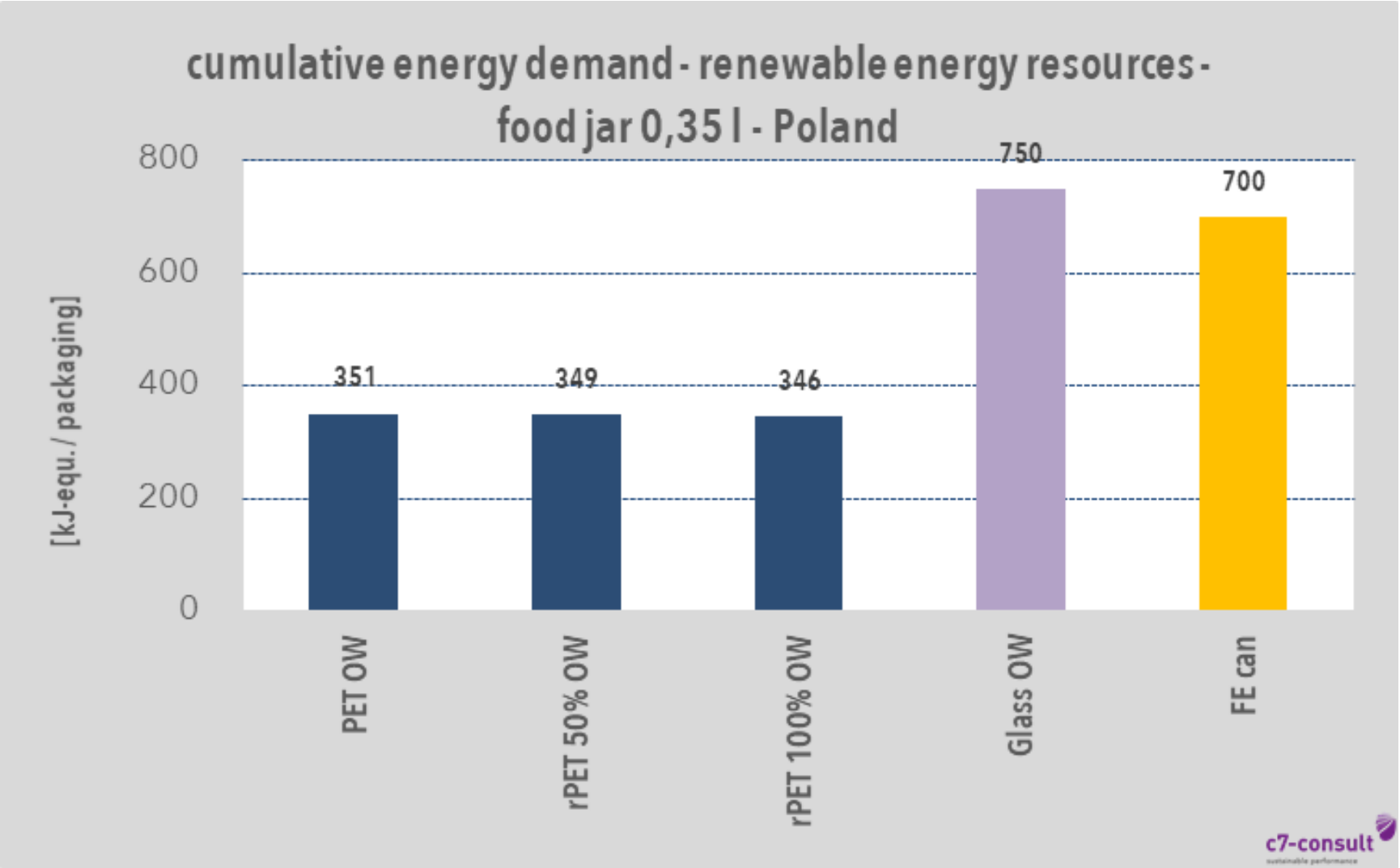
Food


terrestrial eutrophication - food jar 0,35 l - Poland
[mmol N-equ. / packaging]
0
1
2
3
4
5
6
1,37
1,34
1,31
4,48
4,90
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

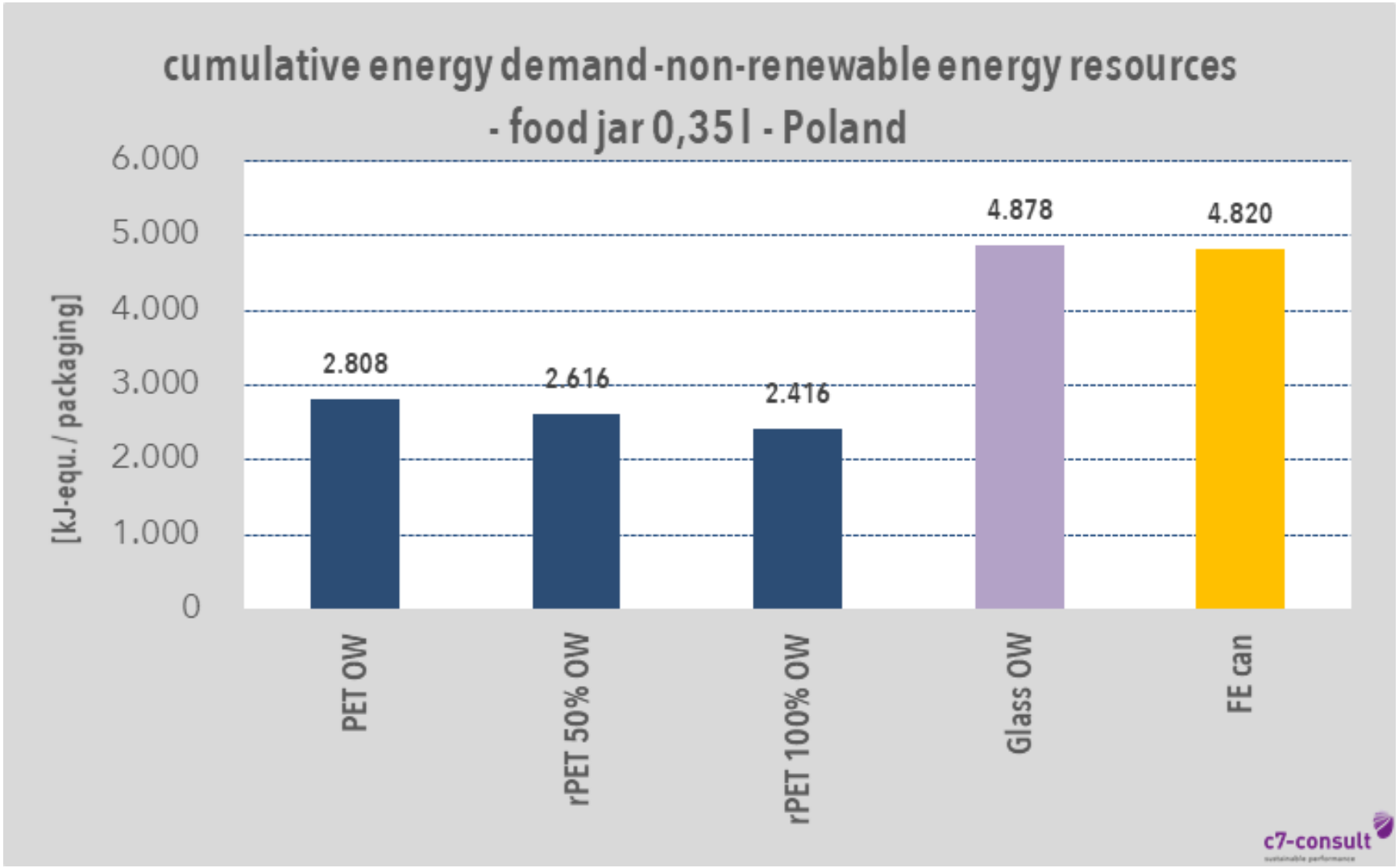
Food


land use - food jar 0,35 l - Poland
[10 cm² / packaging]
120
100
80
60
40
20
0
40,1
40,0
39,9
96,9
70,7
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

Food


cumulative energy demand - renewable energy resources -
food jar 0,35 l - Poland
[kJ-equ./ packaging]
800
600
400
200
0
351
349
346
750
700
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

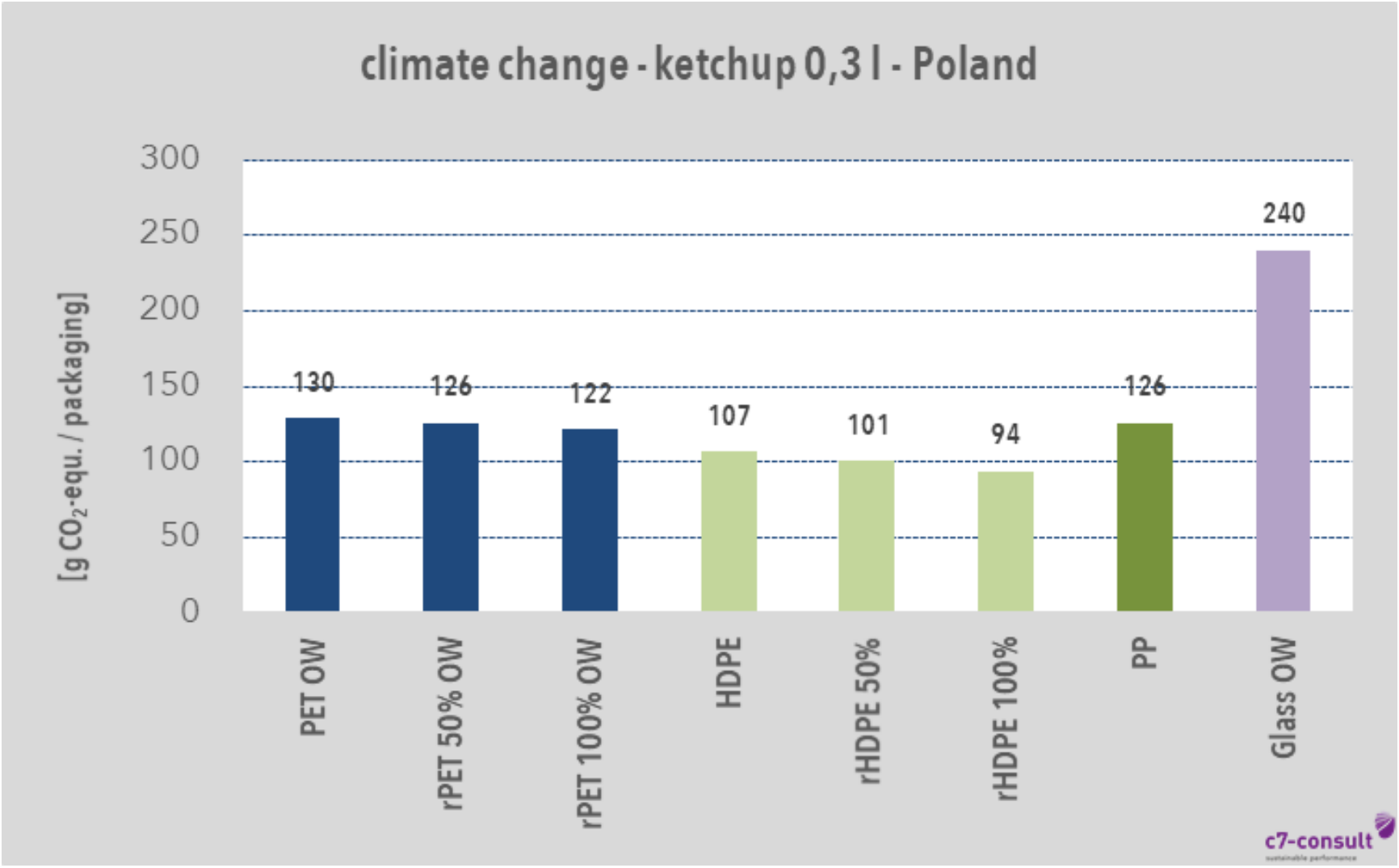
Food


cumulative energy demand -non-renewable energy resources
- food jar 0,35 l - Poland
[kJ-equ./ packaging]
6.000
5.000
4.000
3.000
2.000
1.000
0
2.808
2.616
2.416
4.878
4.820
PET OW
rPET 50% OW
rPET 100% OW
Glass OW
FE can
c7-consult

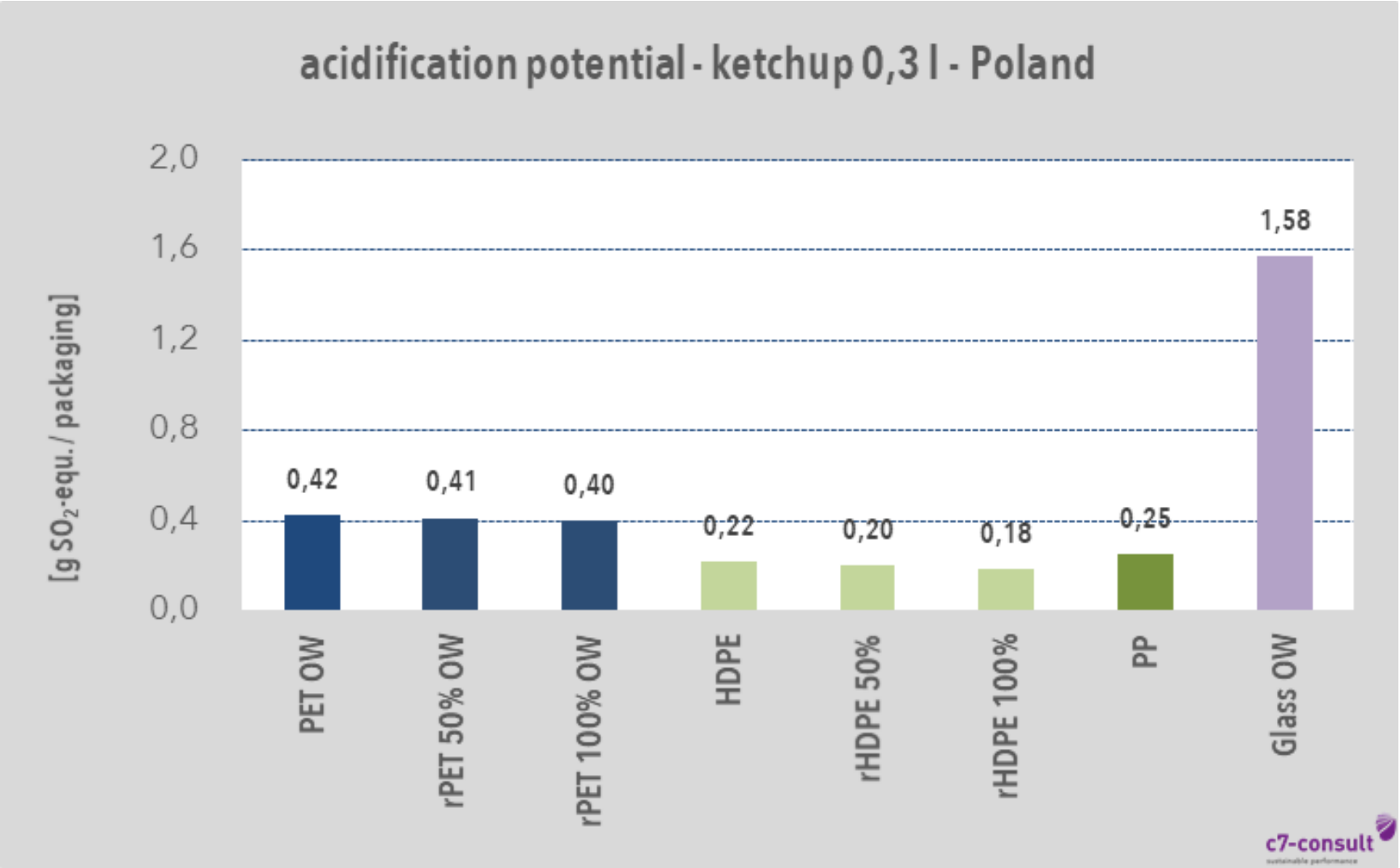
c7-consult
sustainable performance

Results Ketchup 300 ml

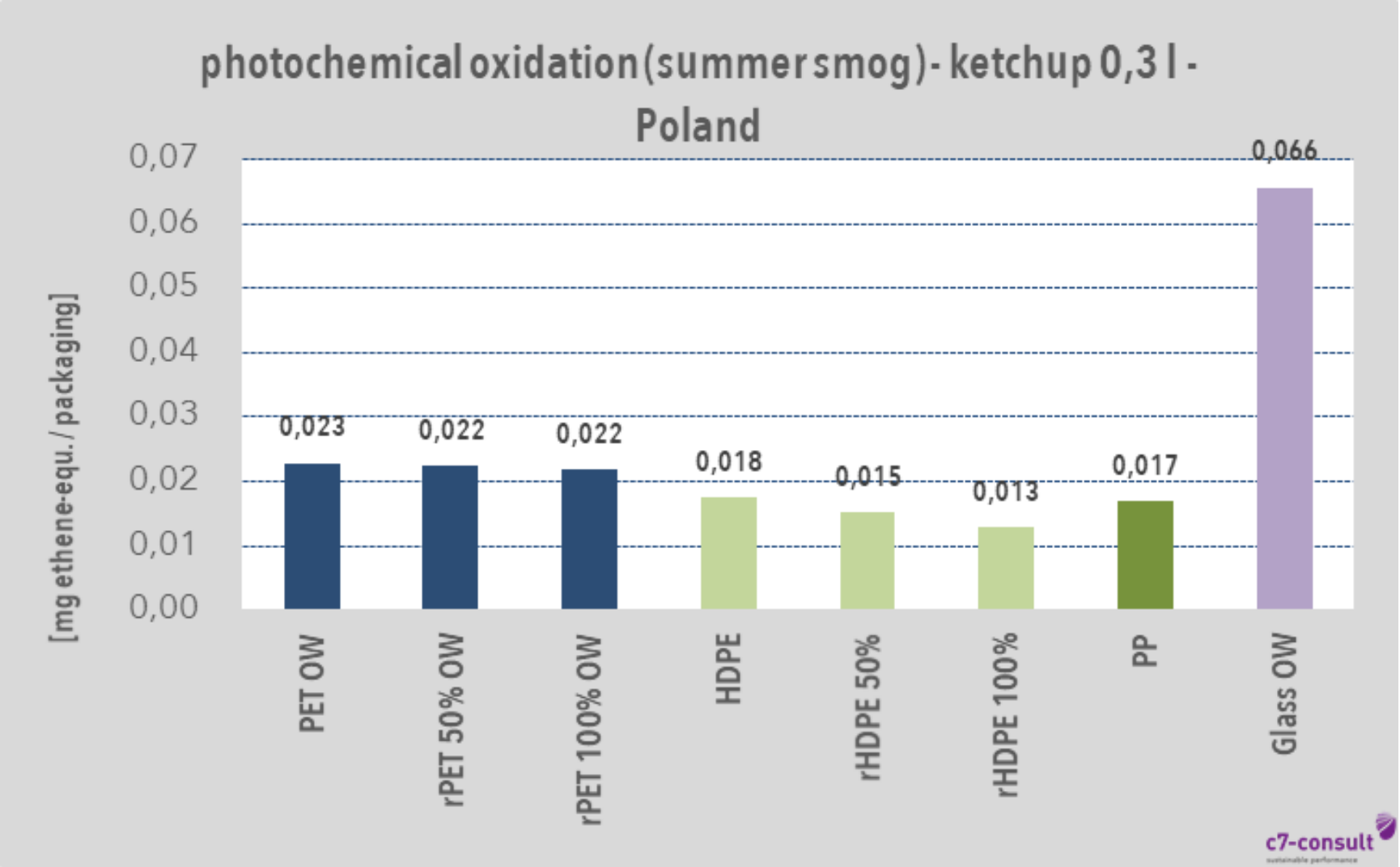
Ketchup


climate change - ketchup 0,3 l - Poland
[g CO_2-equ. / packaging]
300
250
200
150
100
50
0
130
126
122
107
101
94
126
240
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

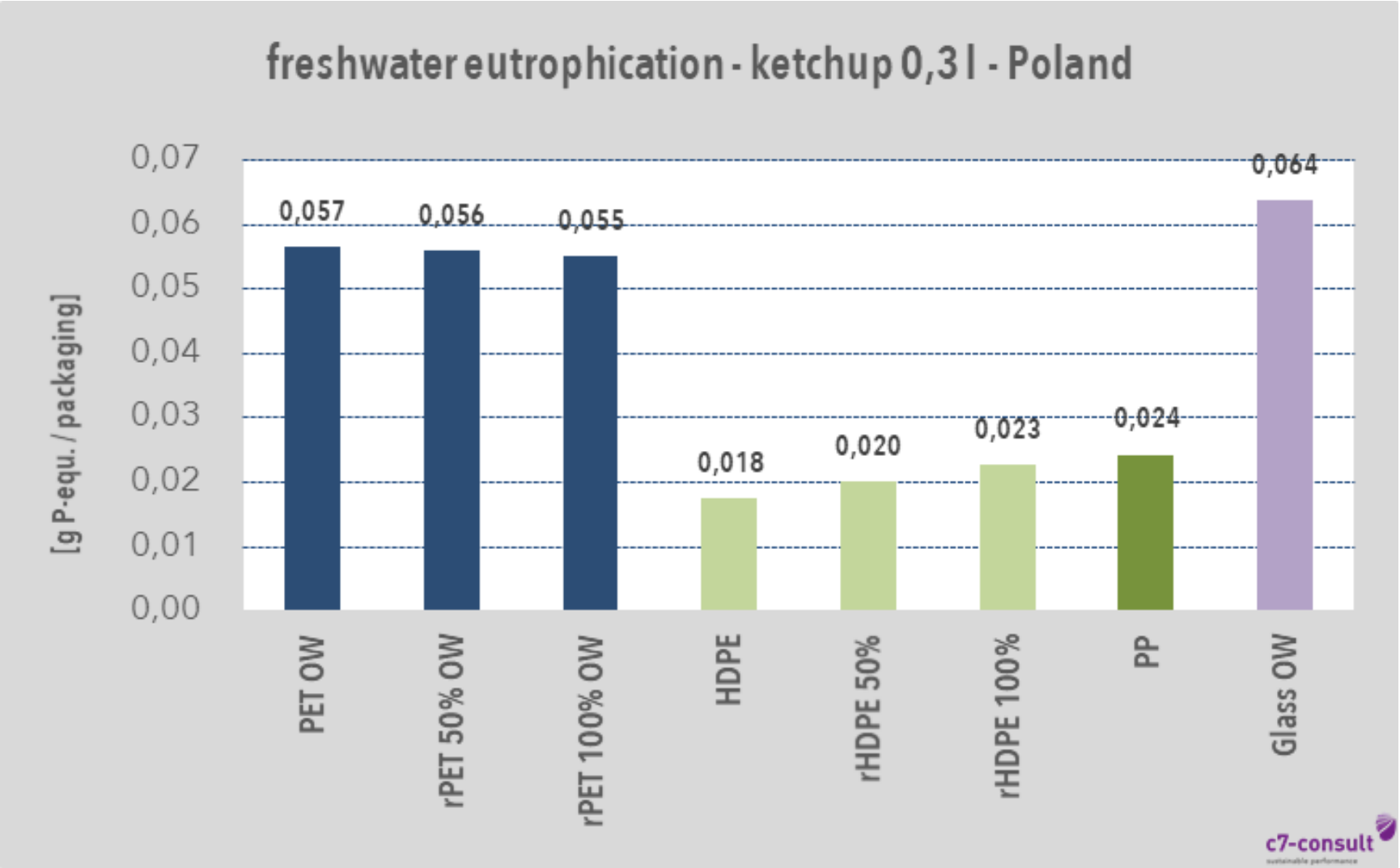
Ketchup


acidification potential - ketchup 0,3 l - Poland
[g SO2-equ./ packaging]
2,0
1,6
1,2
0,8
0,4
0,0
0,42
0,41
0,40
0,22
0,20
0,18
0,25
1,58
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

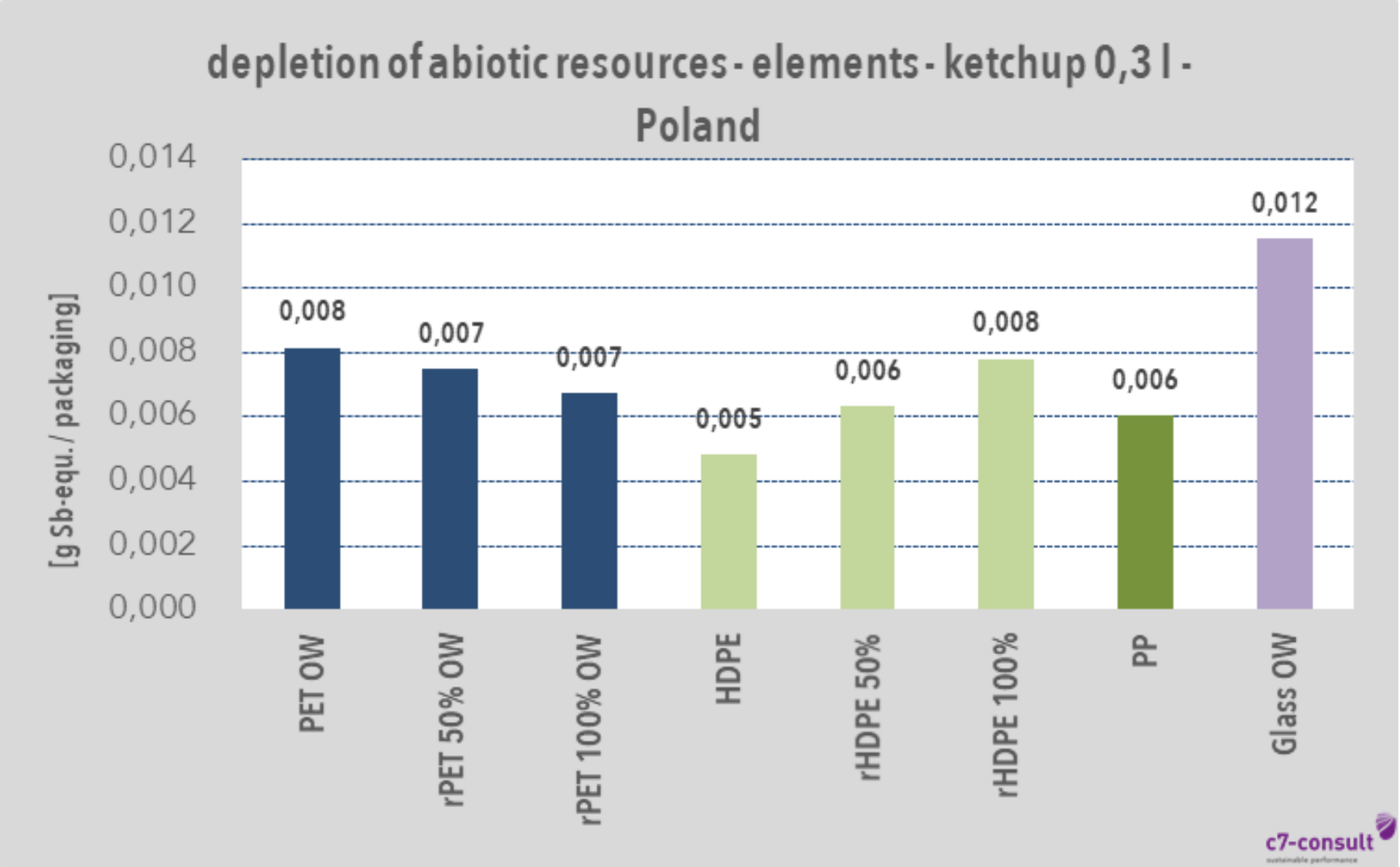
Ketchup


photochemical oxidation (summer smog) - ketchup 0,3 l - Poland
[mg ethene-equ. / packaging]
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0,00
0,023
0,022
0,022
0,018
0,015
0,013
0,017
0,066
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

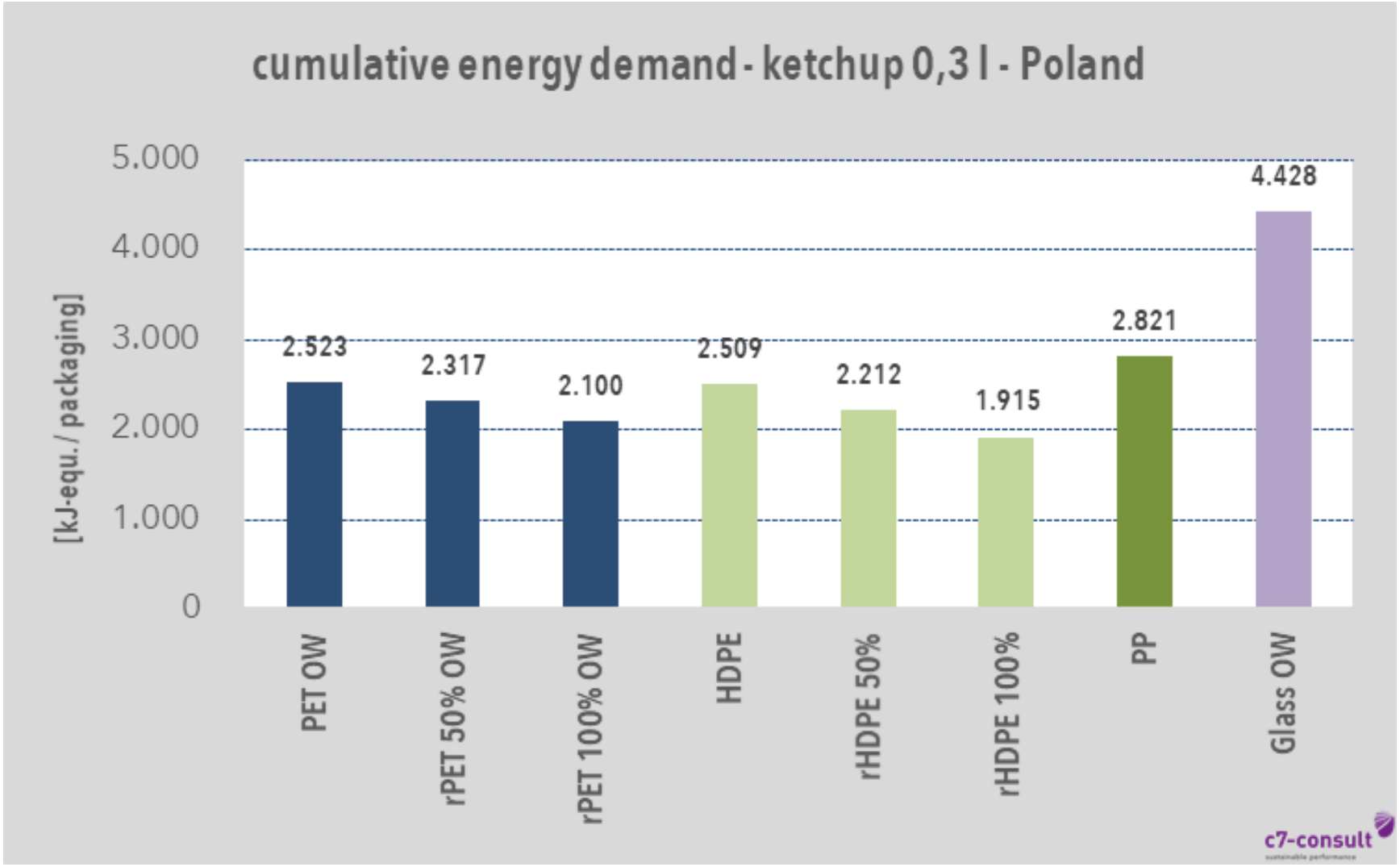
Ketchup


freshwater eutrophication - ketchup 0,3 l - Poland
[g P-equ. / packaging]
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0,00
0,057
0,056
0,055
0,018
0,020
0,023
0,024
0,064
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

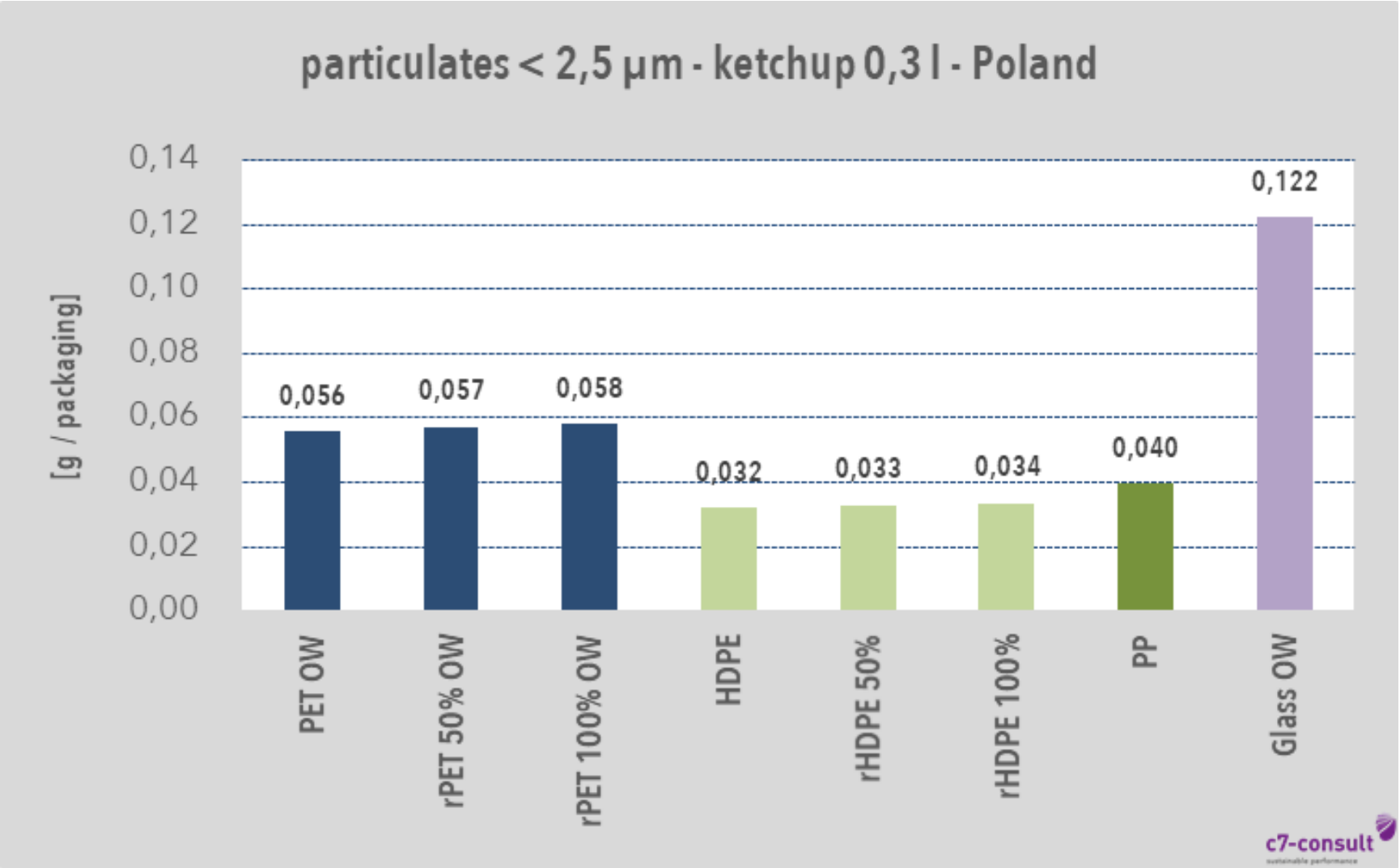
Ketchup


depletion of abiotic resources - elements - ketchup 0,3 l - Poland
[g Sb-equ. / packaging]
0,014
0,012
0,010
0,008
0,006
0,004
0,002
0,000
0,008
0,007
0,007
0,005
0,006
0,008
0,006
0,012
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

Ketchup


cumulative energy demand - ketchup 0,3 l - Poland
[kJ-equ./ packaging]
5.000
4.000
3.000
2.000
1.000
0
2.523
2.317
2.100
2.509
2.212
1.915
2.821
4.428
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

Ketchup


particulates < 2,5 µm - ketchup 0,3 l - Poland
[g / packaging]
0,14
0,12
0,10
0,08
0,06
0,04
0,02
0,00
0,056
0,057
0,058
0,032
0,033
0,034
0,040
0,122
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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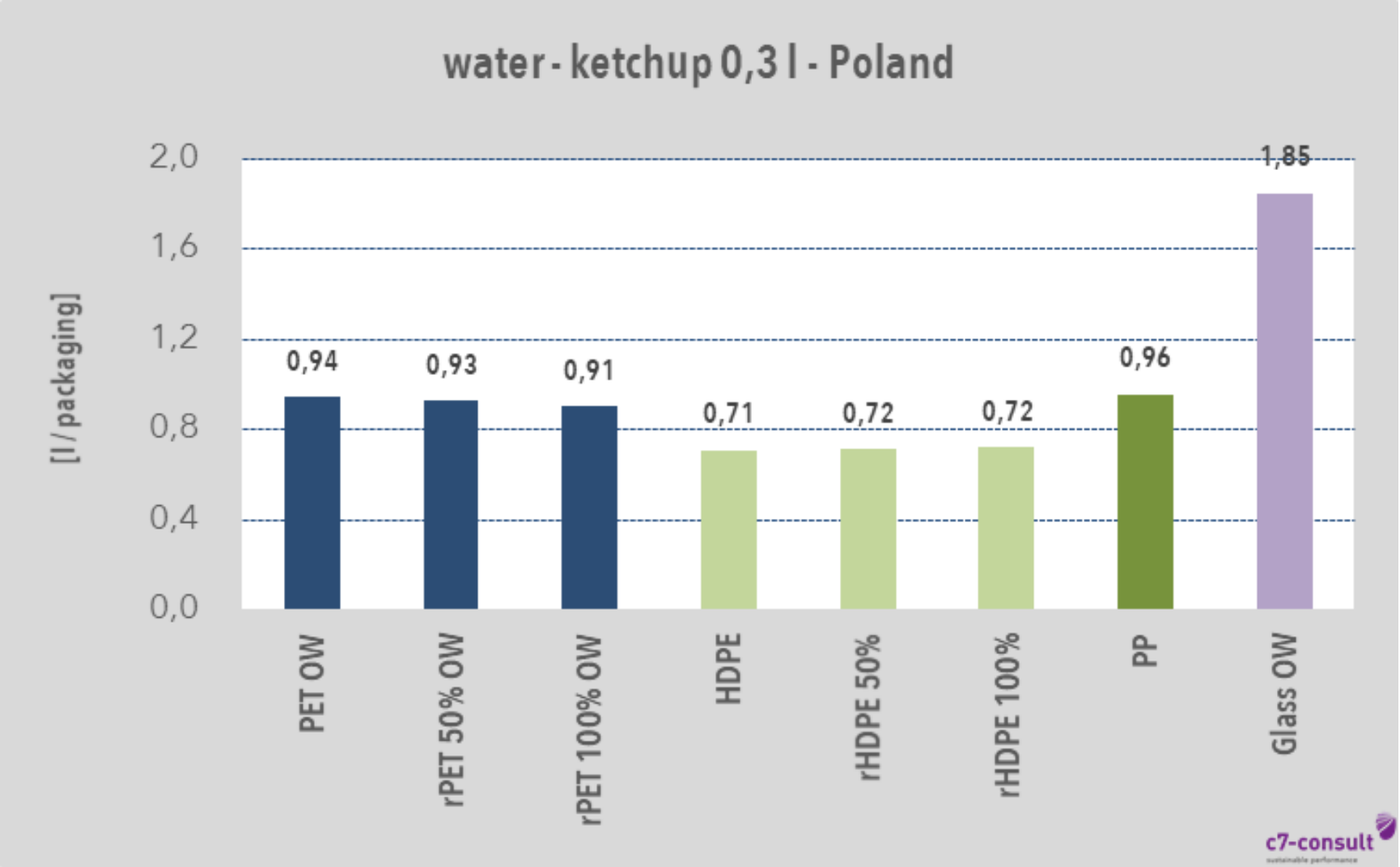
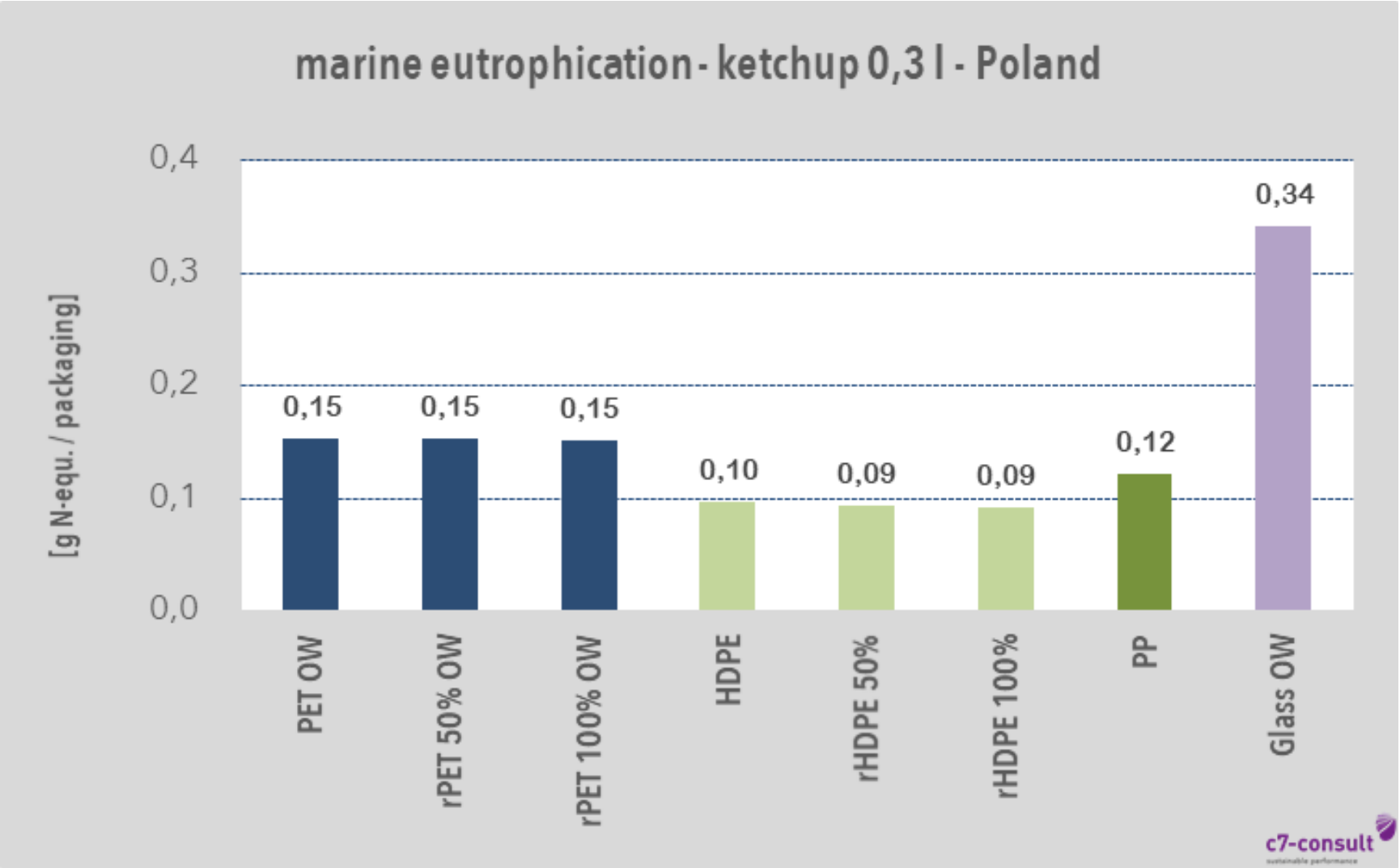
Ketchup


water - ketchup 0,3 l - Poland
[l / packaging]
2,0
1,6
1,2
0,8
0,4
0,0
0,94
0,93
0,91
0,71
0,72
0,72
0,96
1,85
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
c7-consult

Ketchup


marine eutrophication - ketchup 0,3 l - Poland
[g N-equ. / packaging]
0,4
0,3
0,2
0,1
0,0
0,15
0,15
0,15
0,10
0,09
0,09
0,12
0,34
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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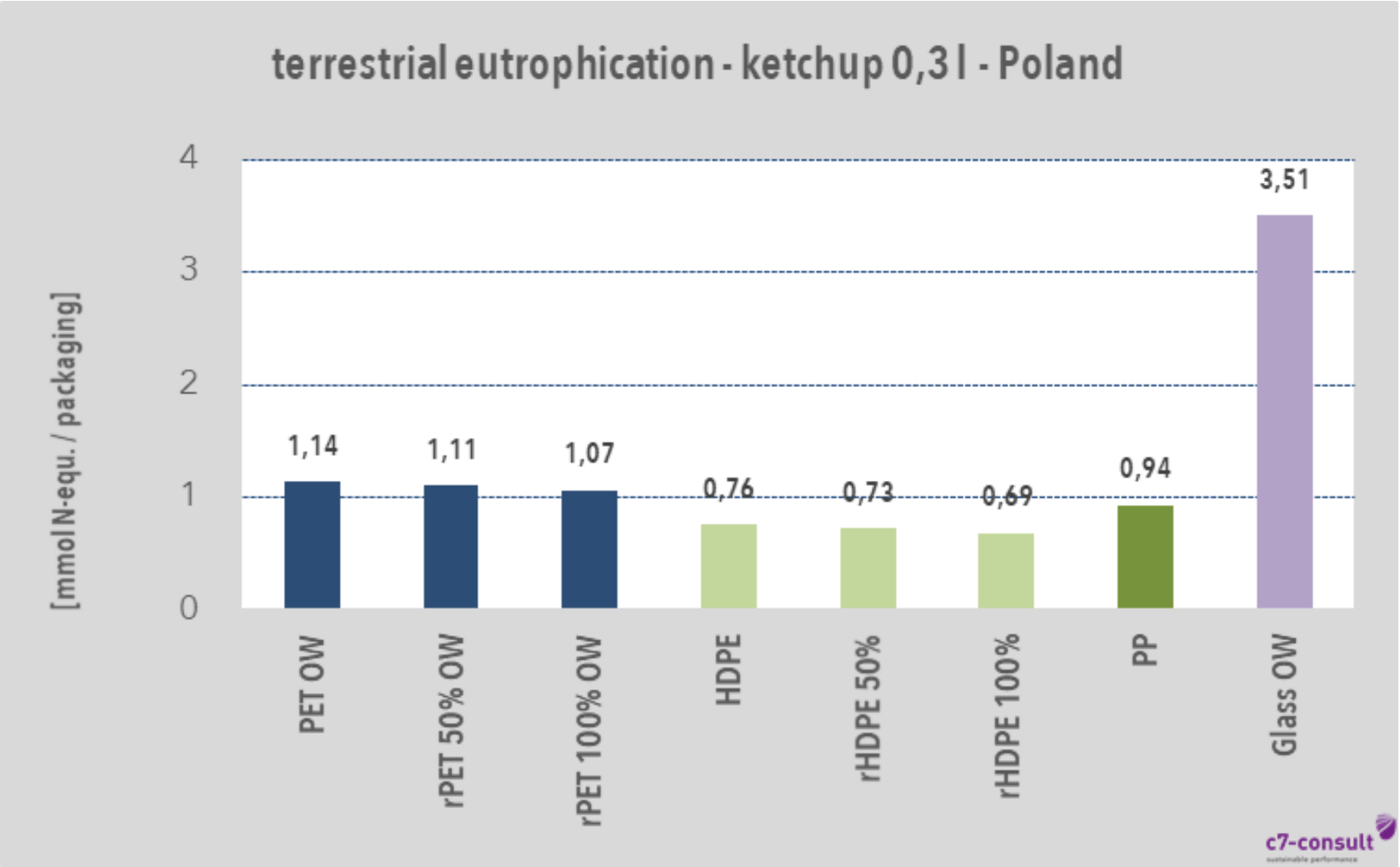
Ketchup


terrestrial eutrophication - ketchup 0,3 l - Poland
[mmol N-equ. / packaging]
4
3
2
1
0
1,14
1,11
1,07
0,76
0,73
0,69
0,94
3,51
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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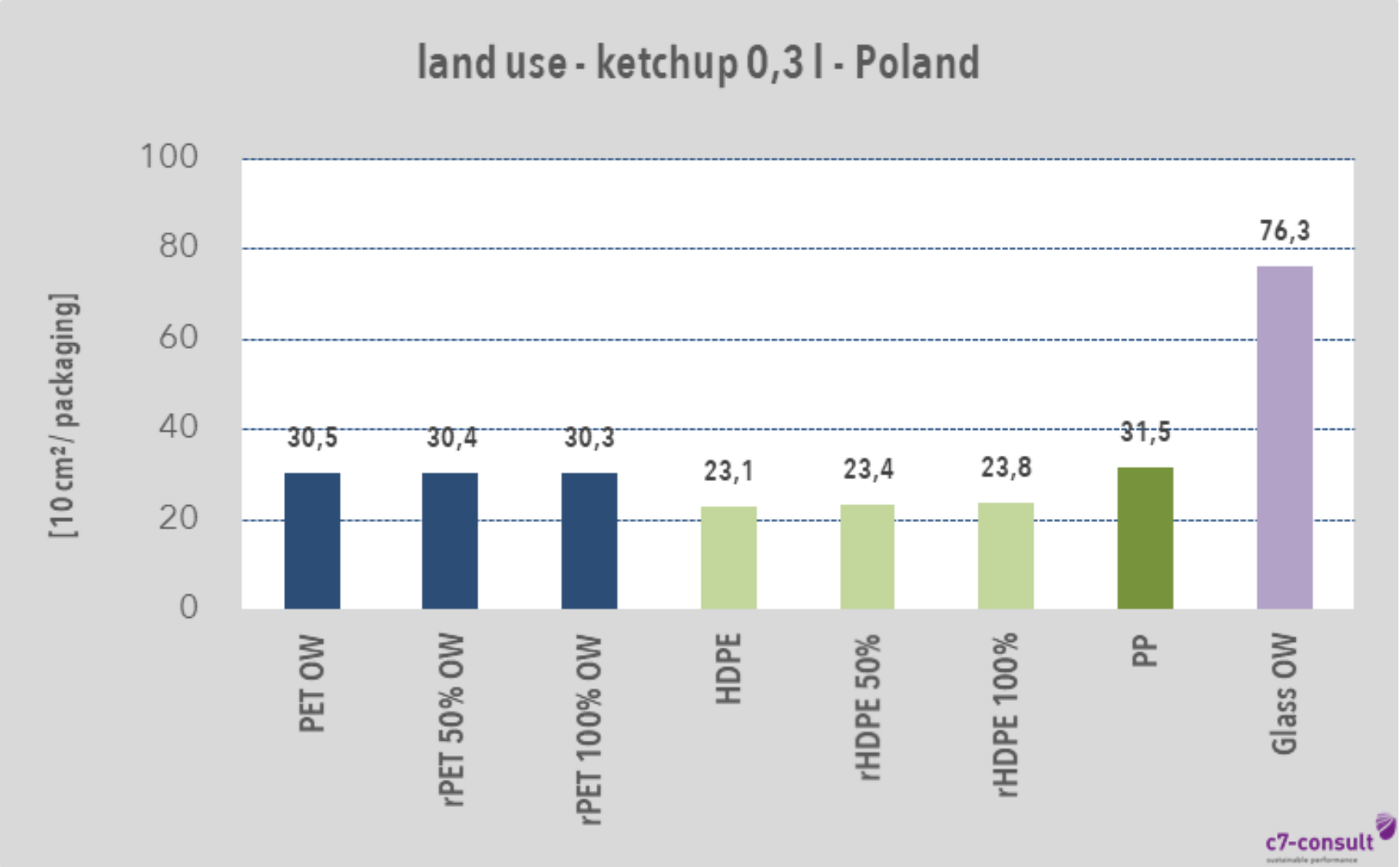
Ketchup


land use - ketchup 0,3 l - Poland
[10 cm² / packaging]
100
80
60
40
20
0
30,5
30,4
30,3
23,1
23,4
23,8
31,5
76,3
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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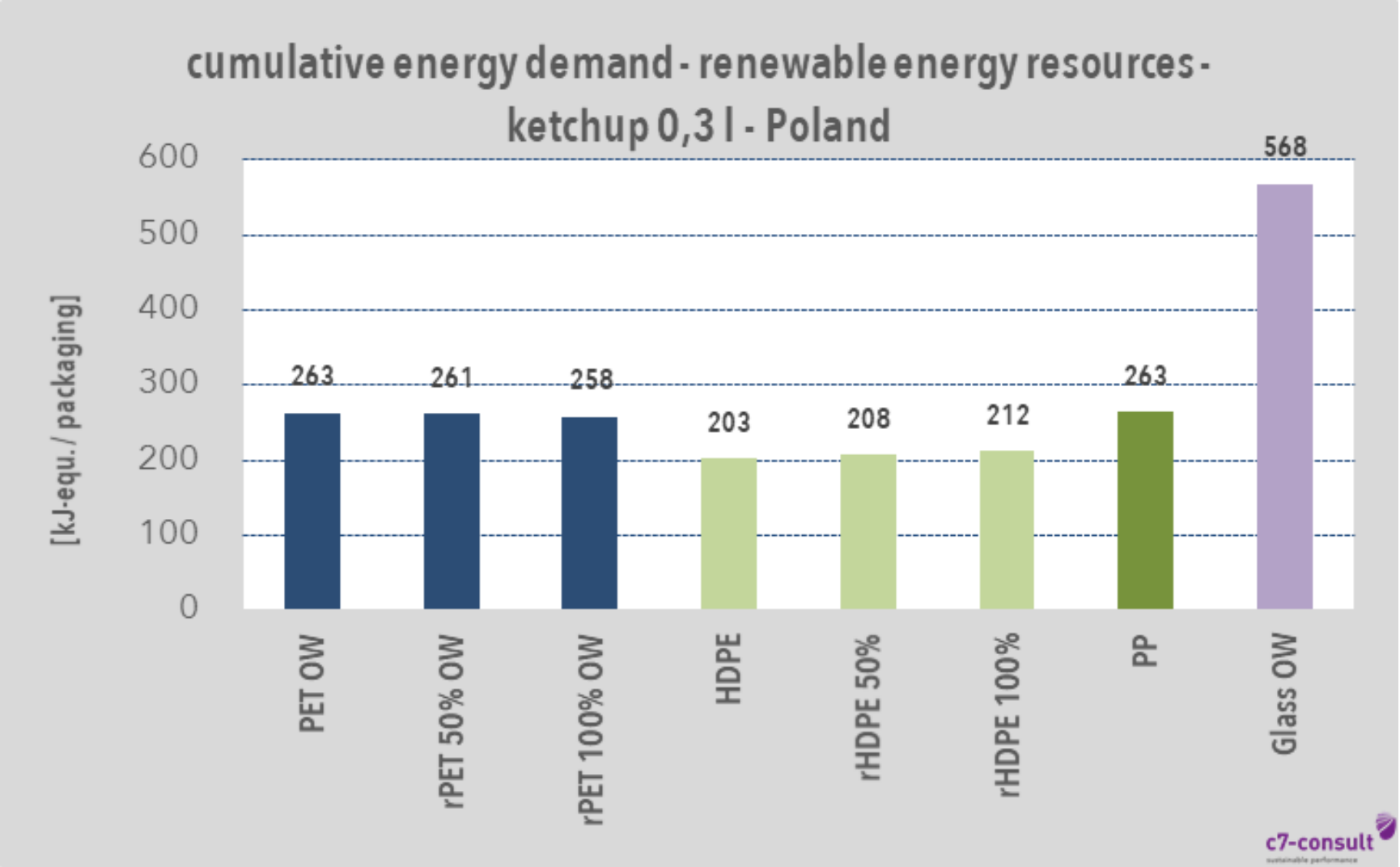
Ketchup


cumulative energy demand - renewable energy resources - ketchup 0,3 l - Poland
[kJ-equ./ packaging]
600
500
400
300
200
100
0
263
261
258
203
208
212
263
568
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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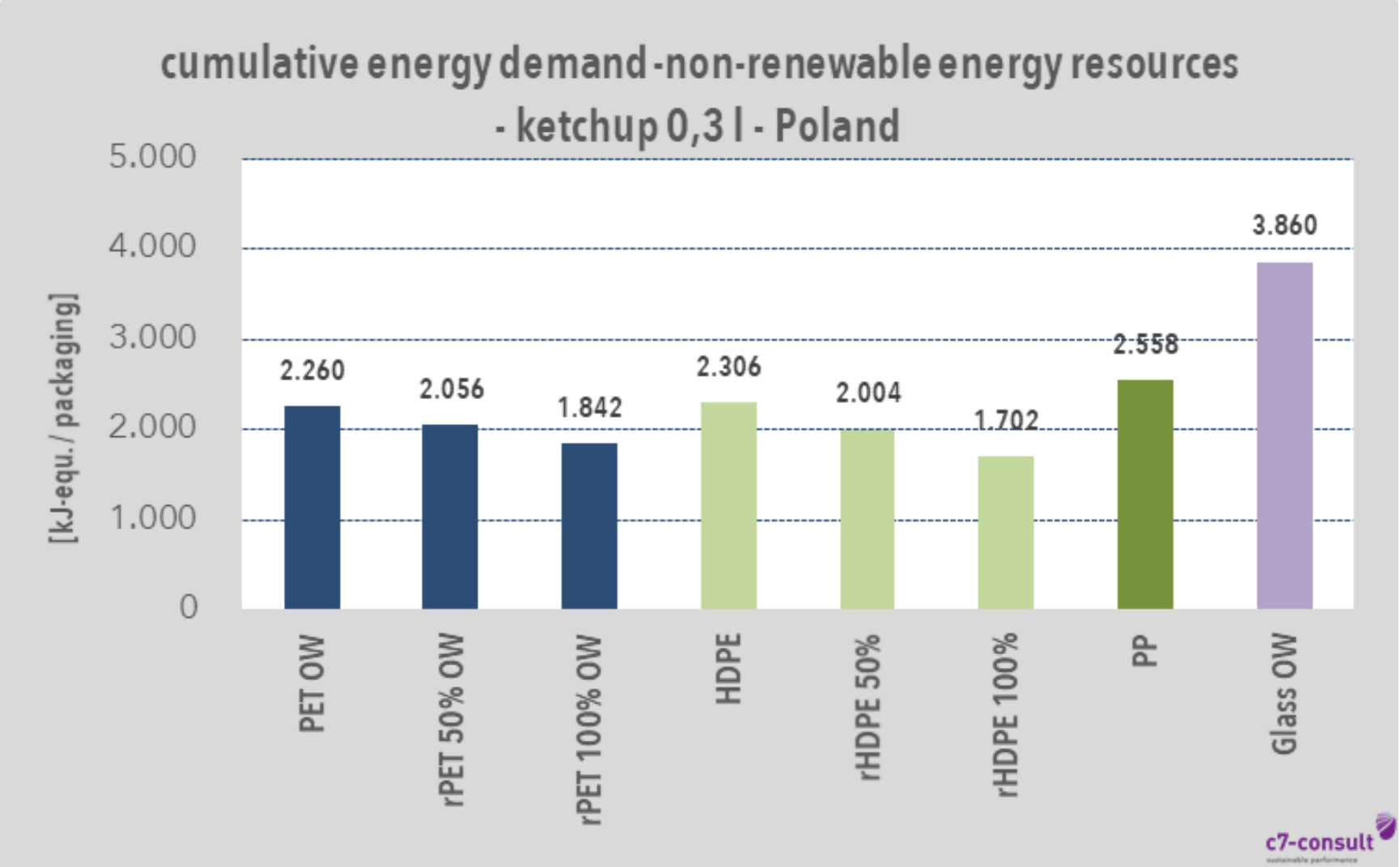
Ketchup


cumulative energy demand -non-renewable energy resources
- ketchup 0,3 l - Poland
[kJ-equ./ packaging]
5.000
4.000
3.000
2.000
1.000
0
2.260
2.056
1.842
2.306
2.004
1.702
2.558
3.860
PET OW
rPET 50% OW
rPET 100% OW
HDPE
rHDPE 50%
rHDPE 100%
PP
Glass OW
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Results Liquid Detergent 1,5 l

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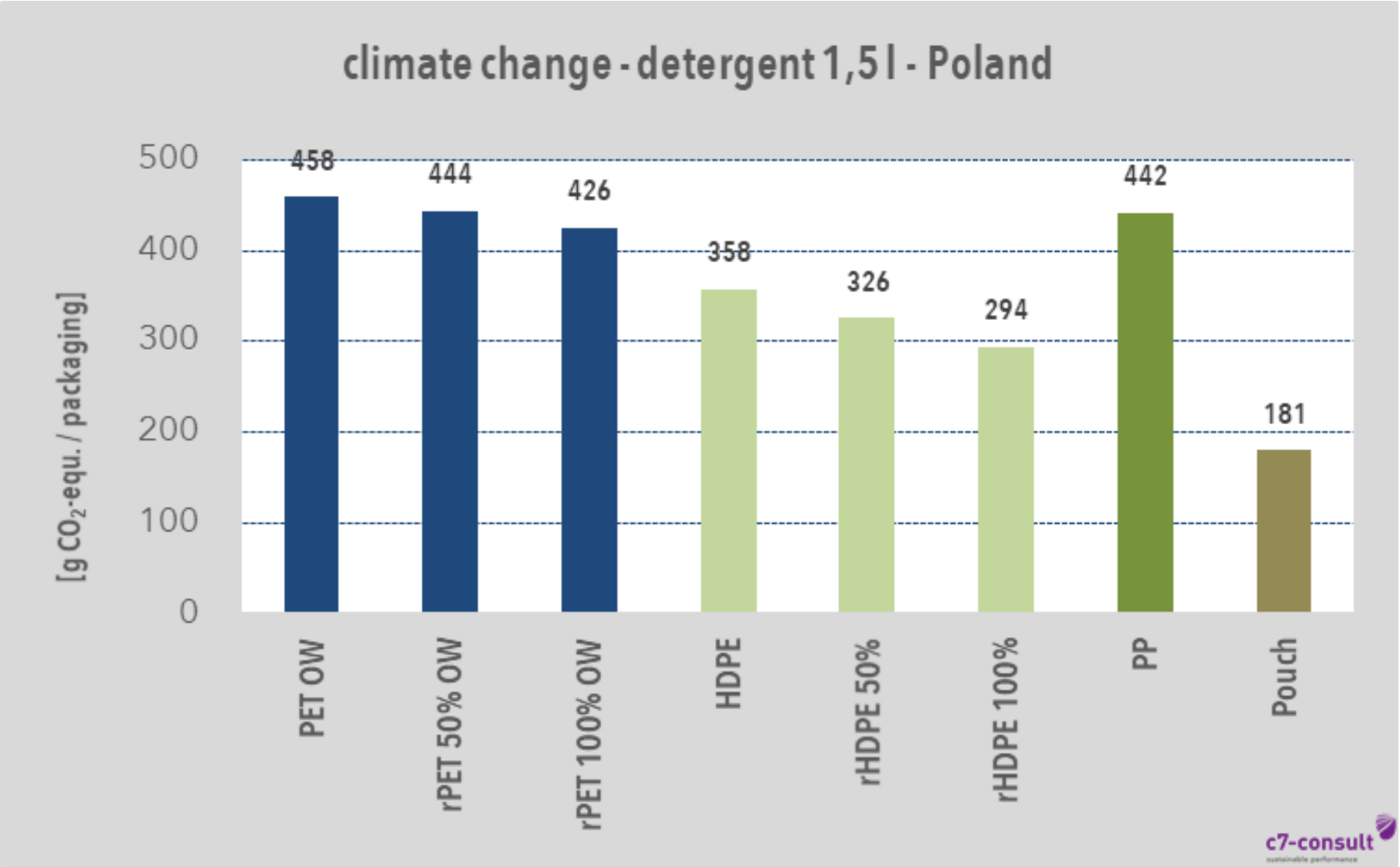
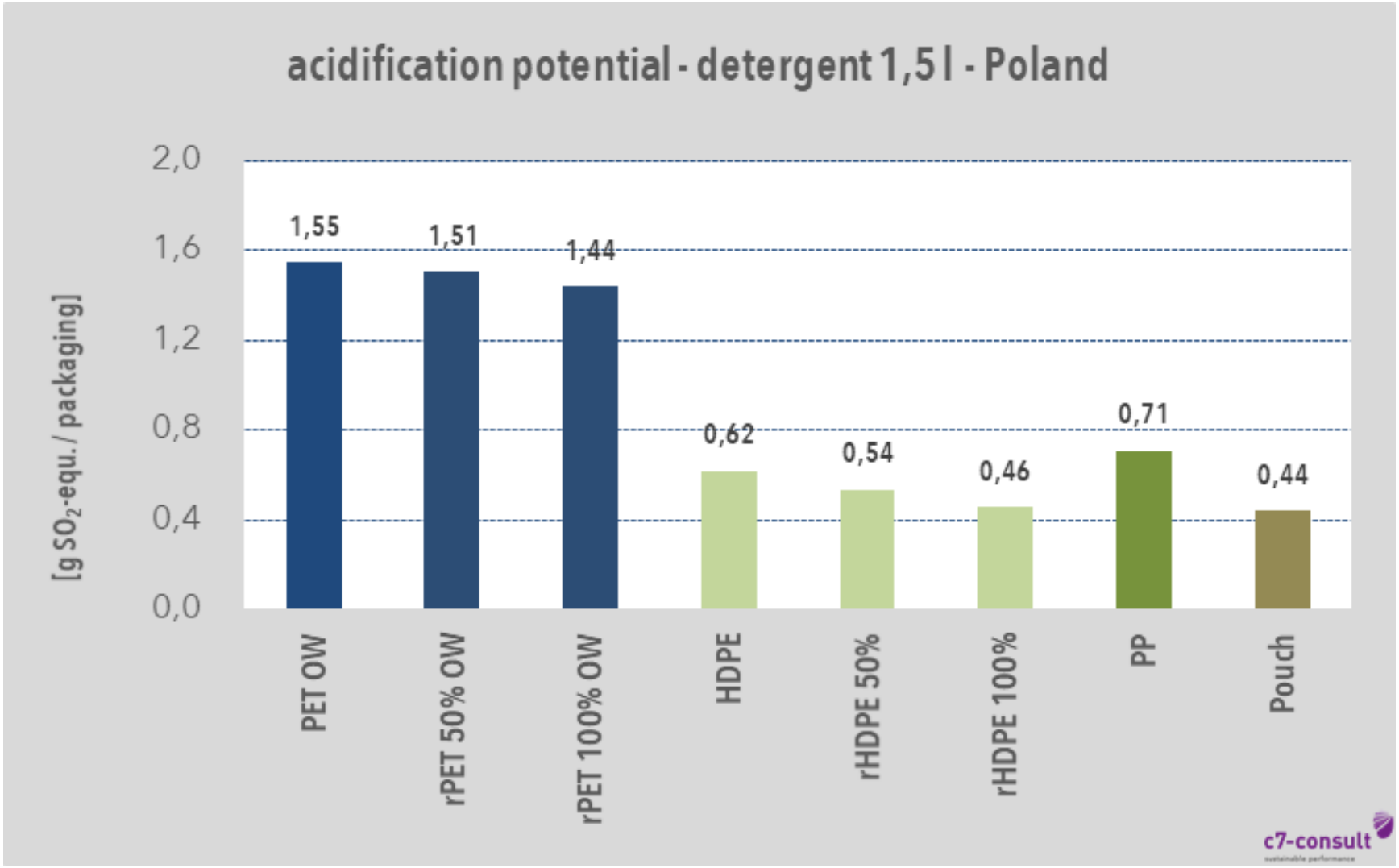
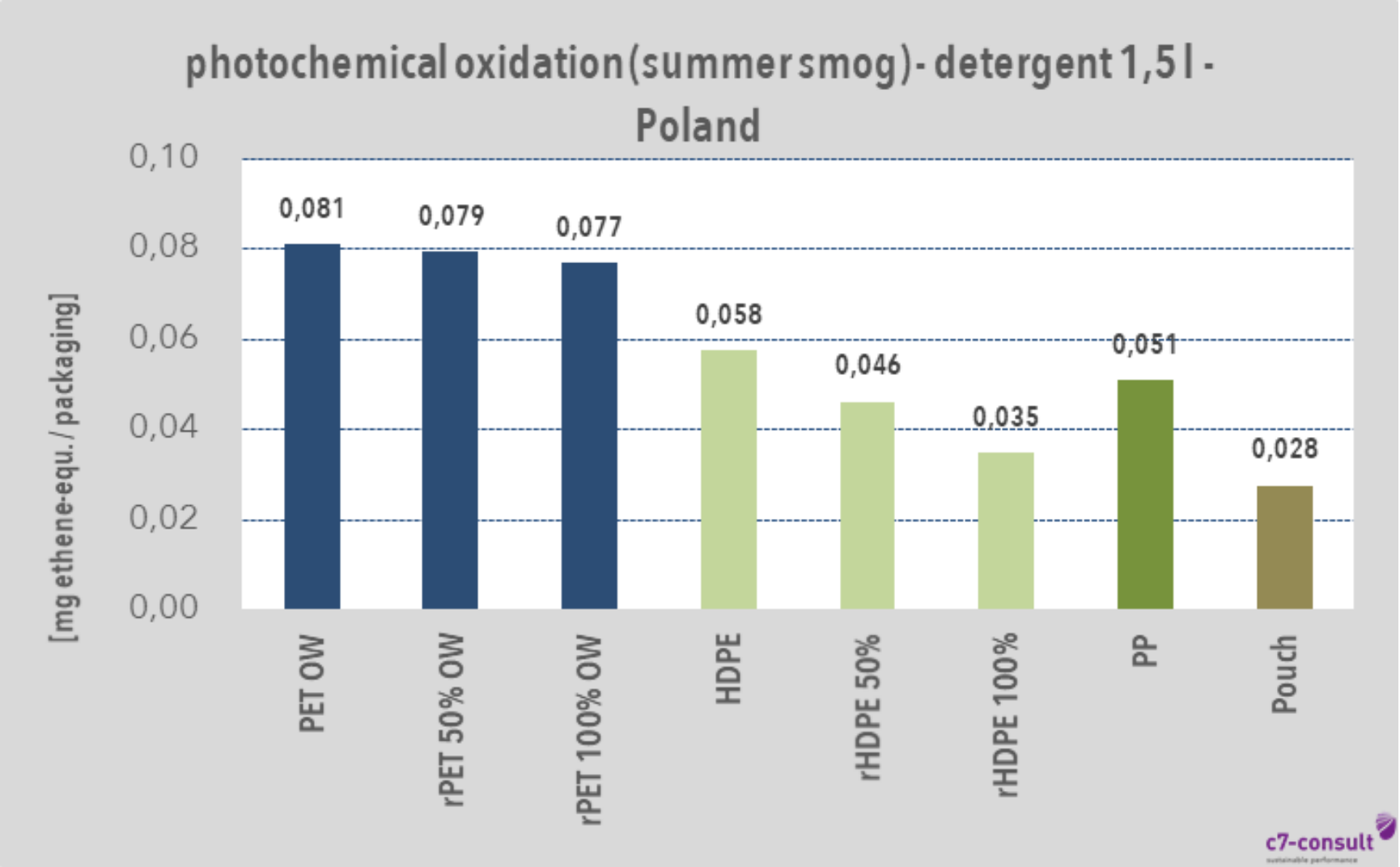
Liquid Detergent



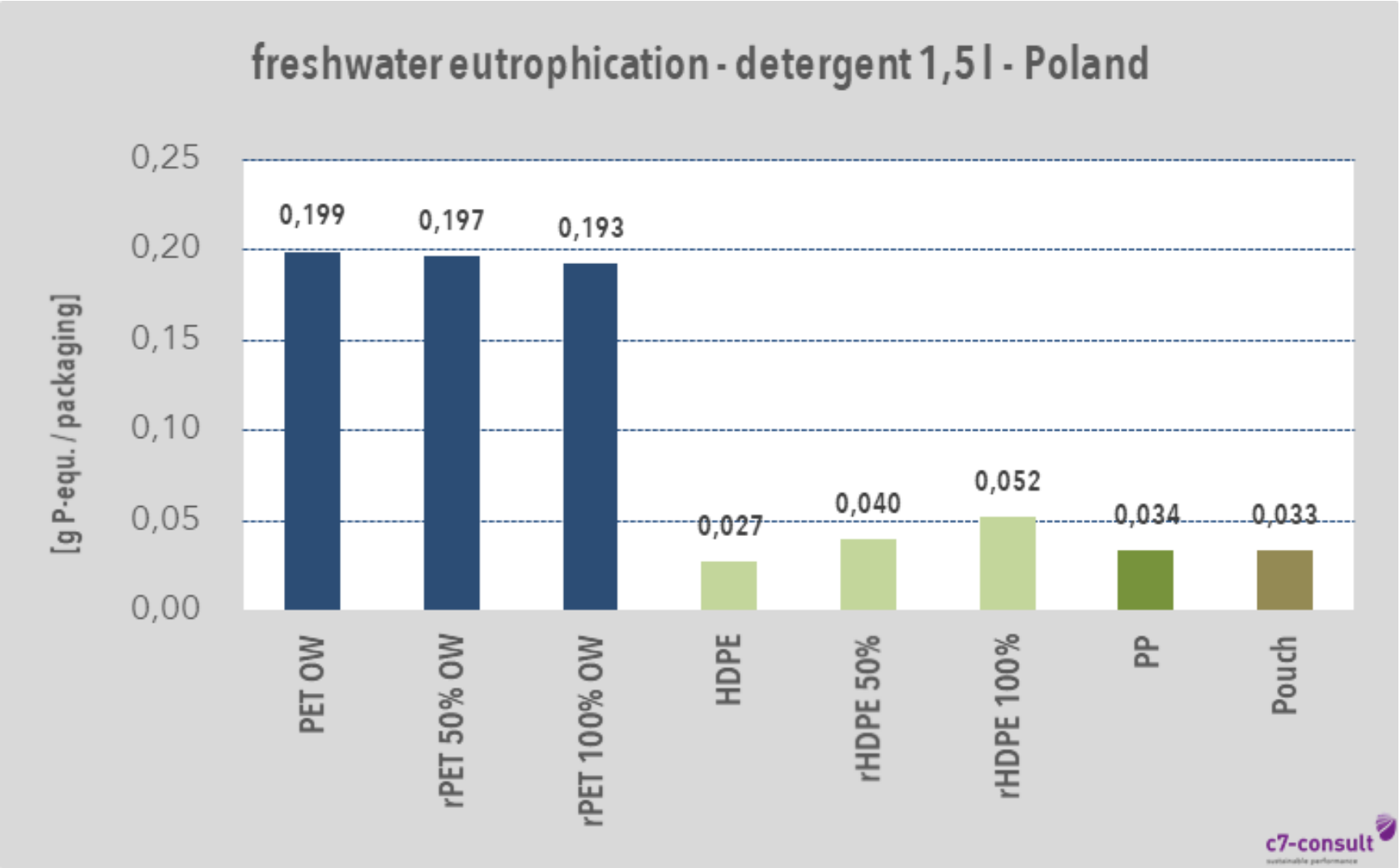
Liquid Detergent



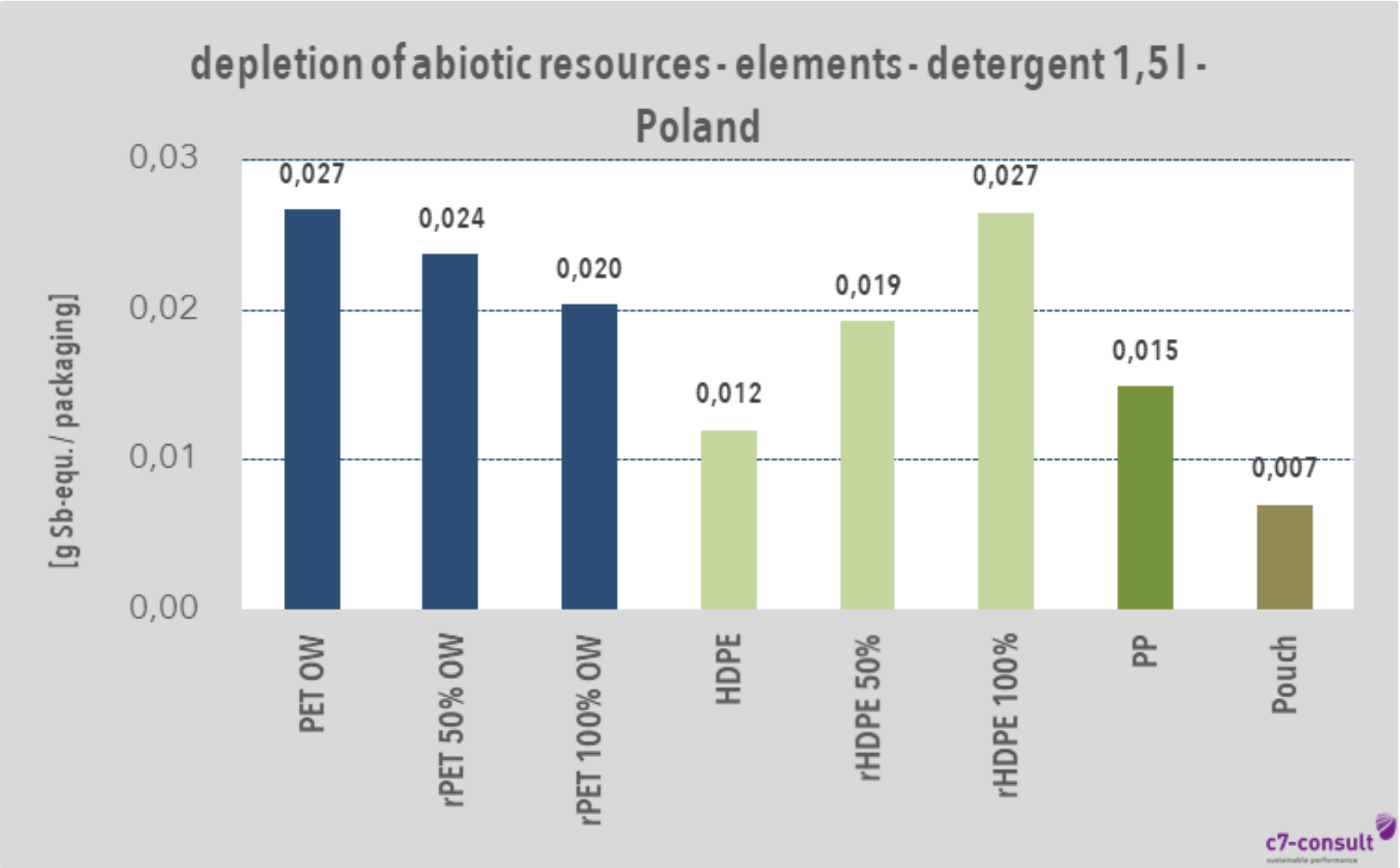
Liquid Detergent



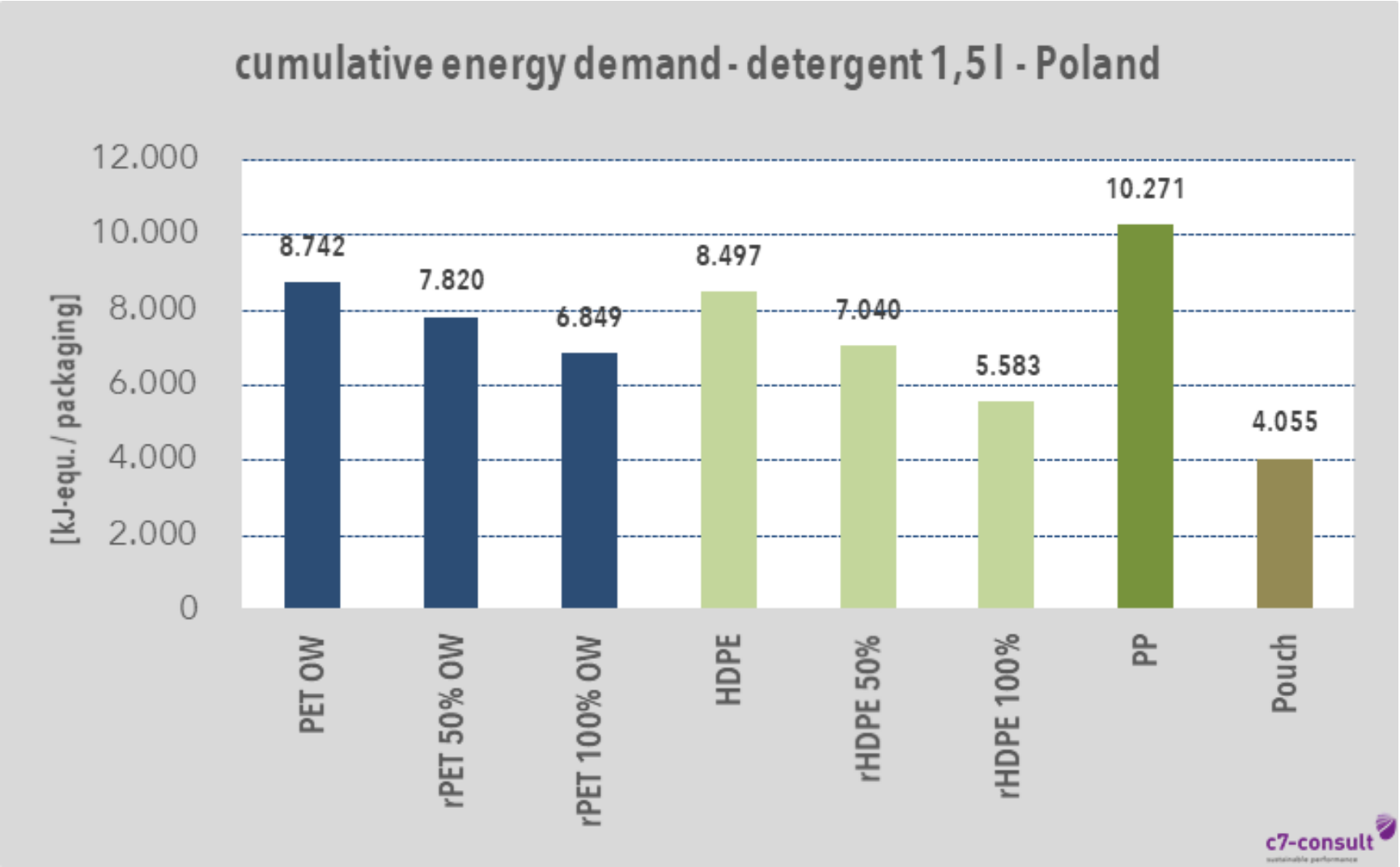
Liquid Detergent



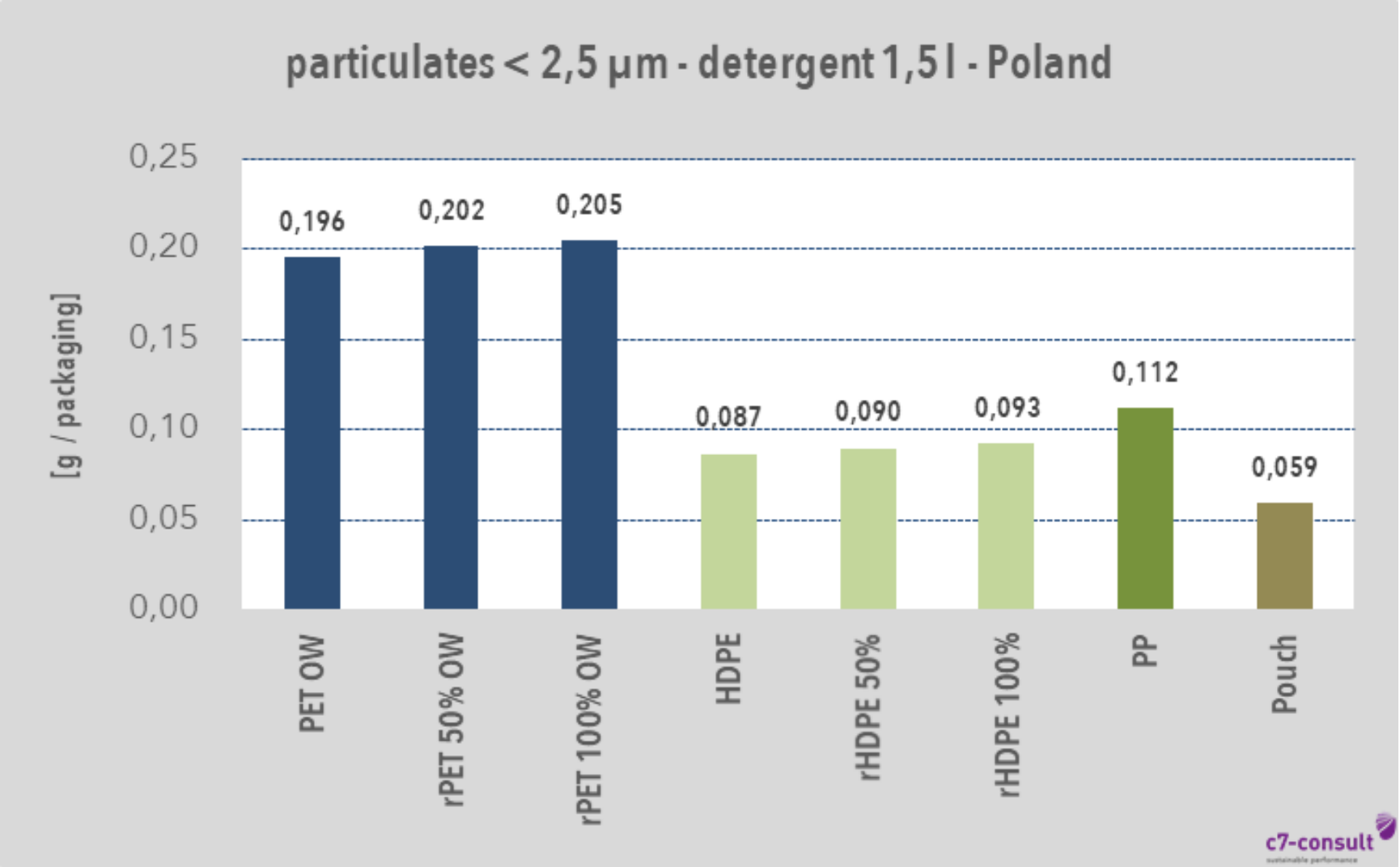
Liquid Detergent



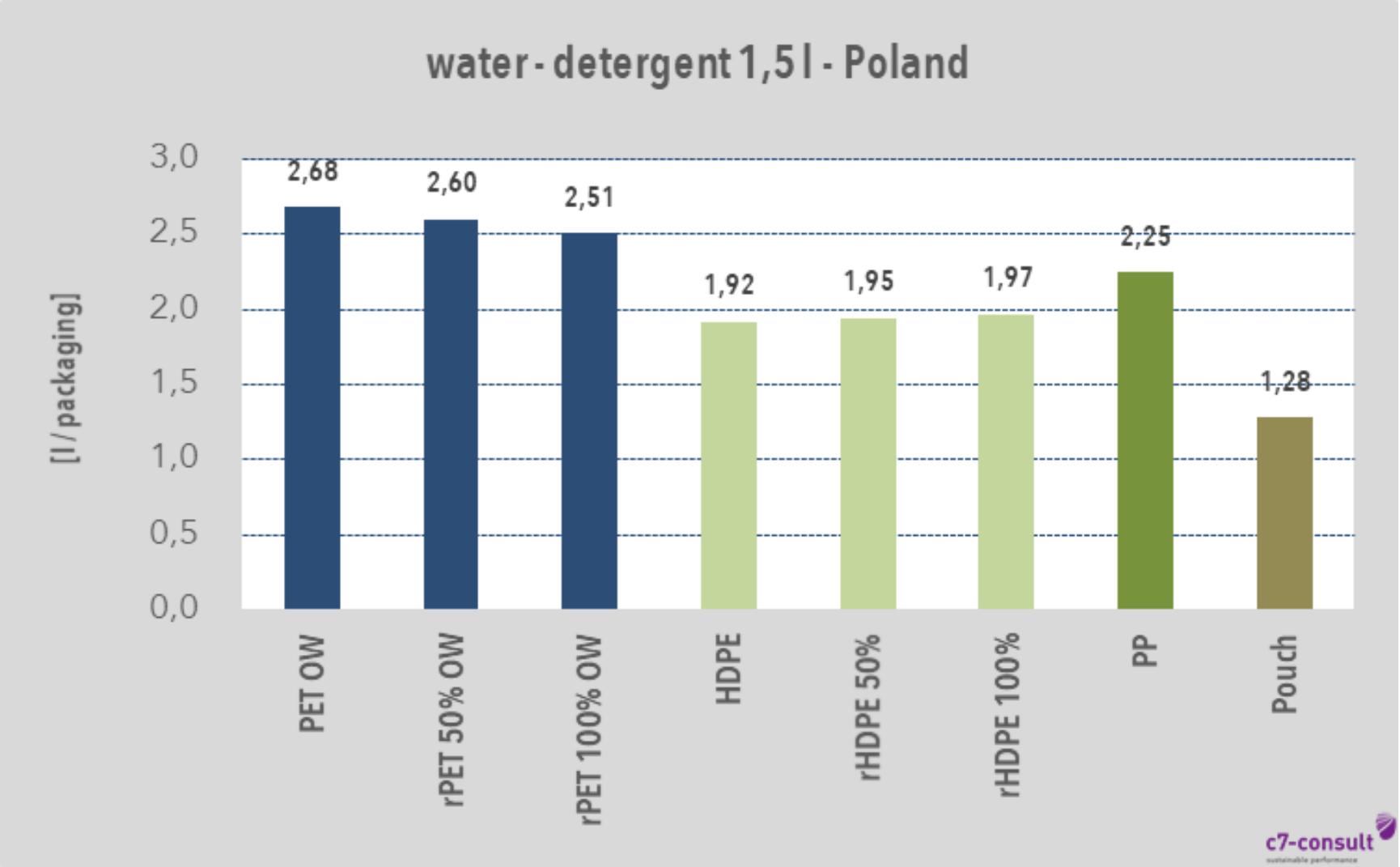
Liquid Detergent



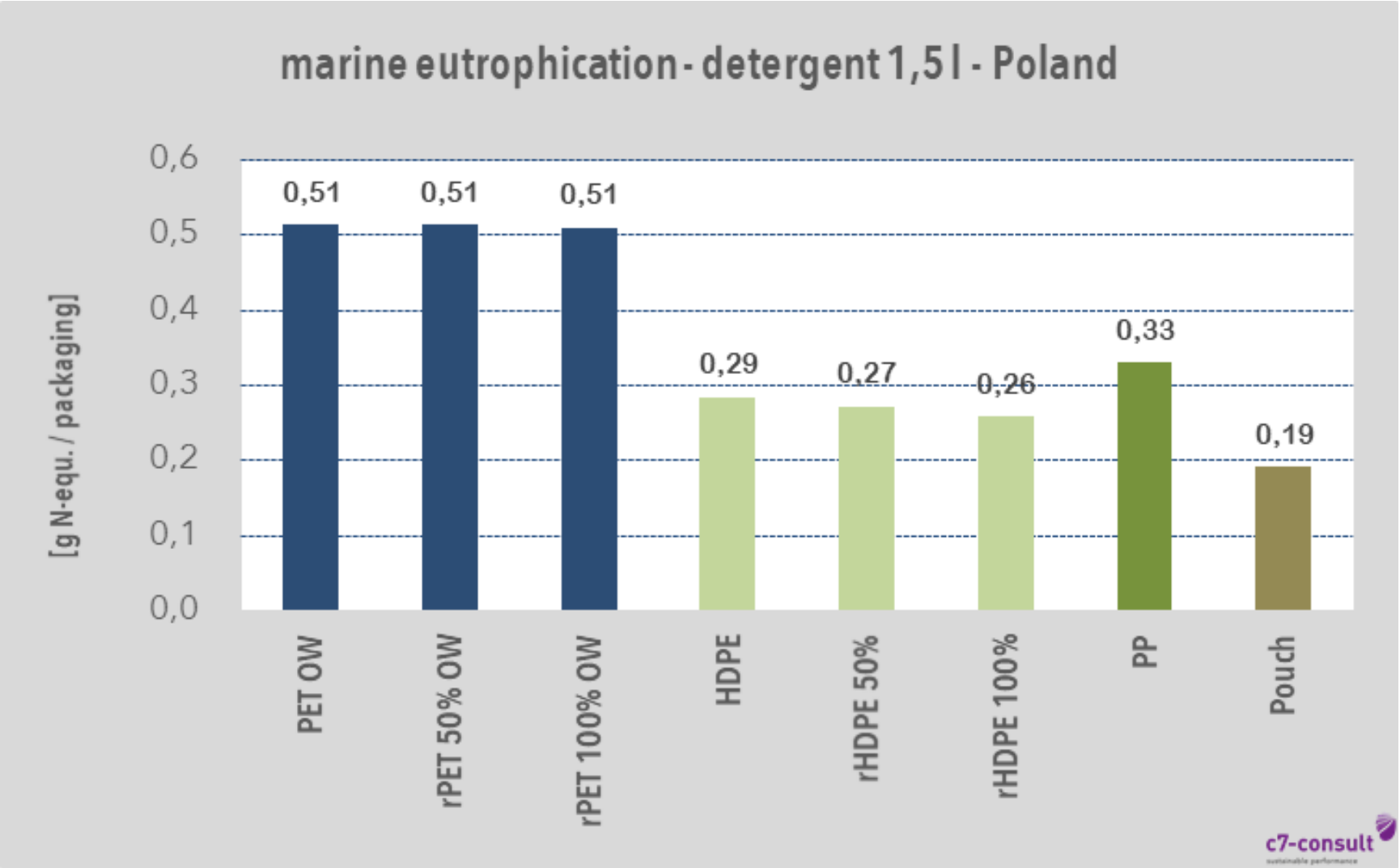
Liquid Detergent



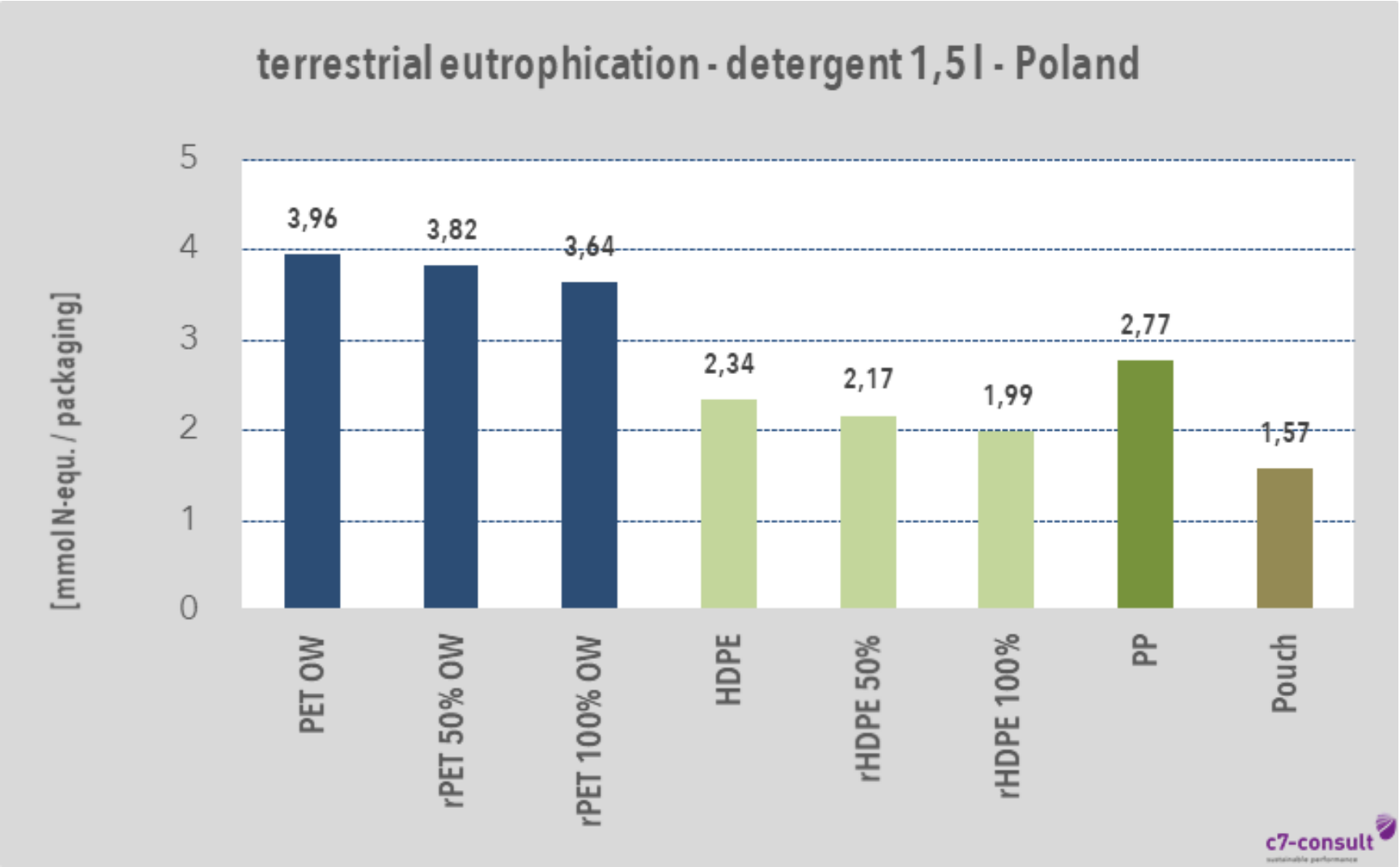
Liquid Detergent



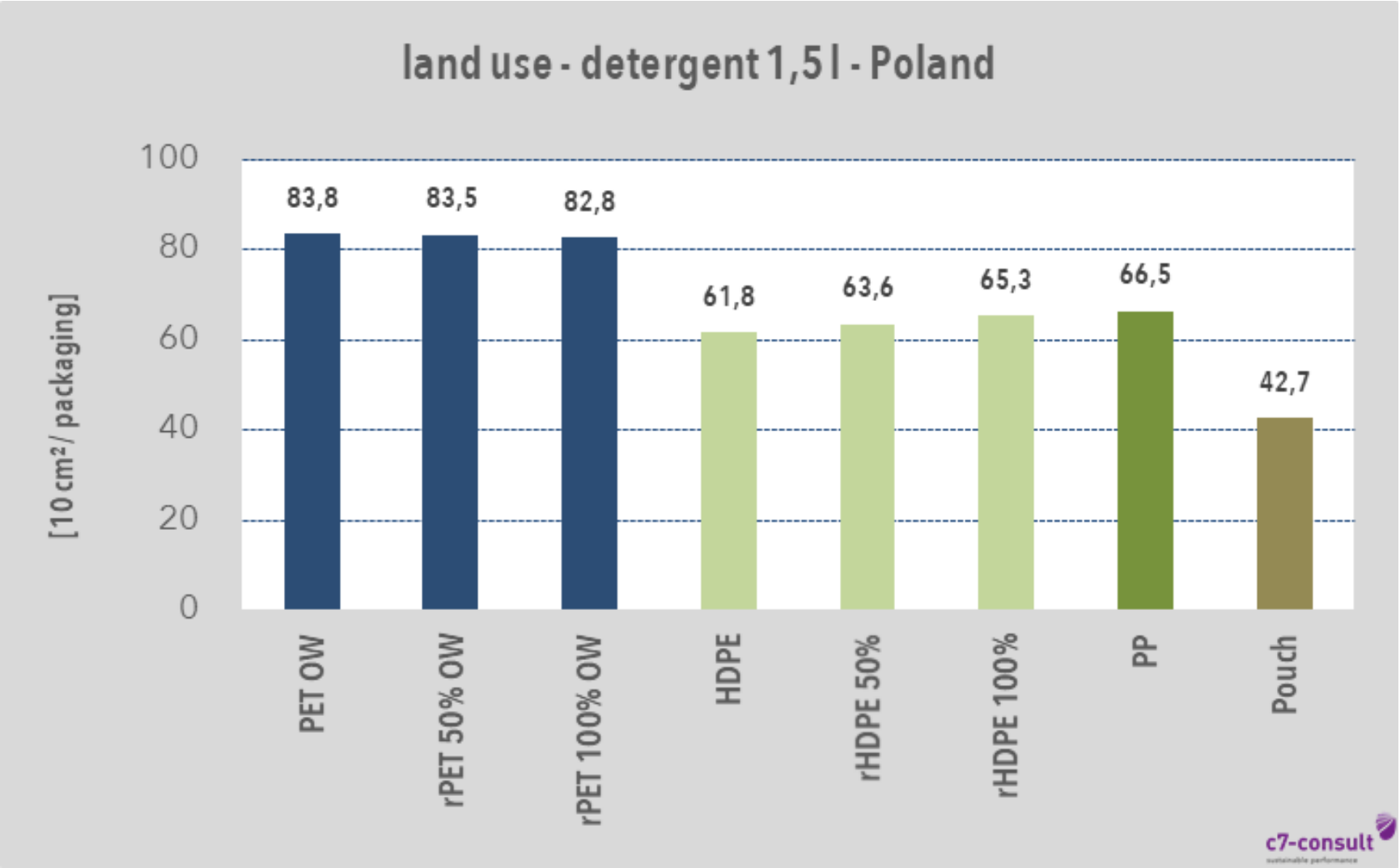
Liquid Detergent



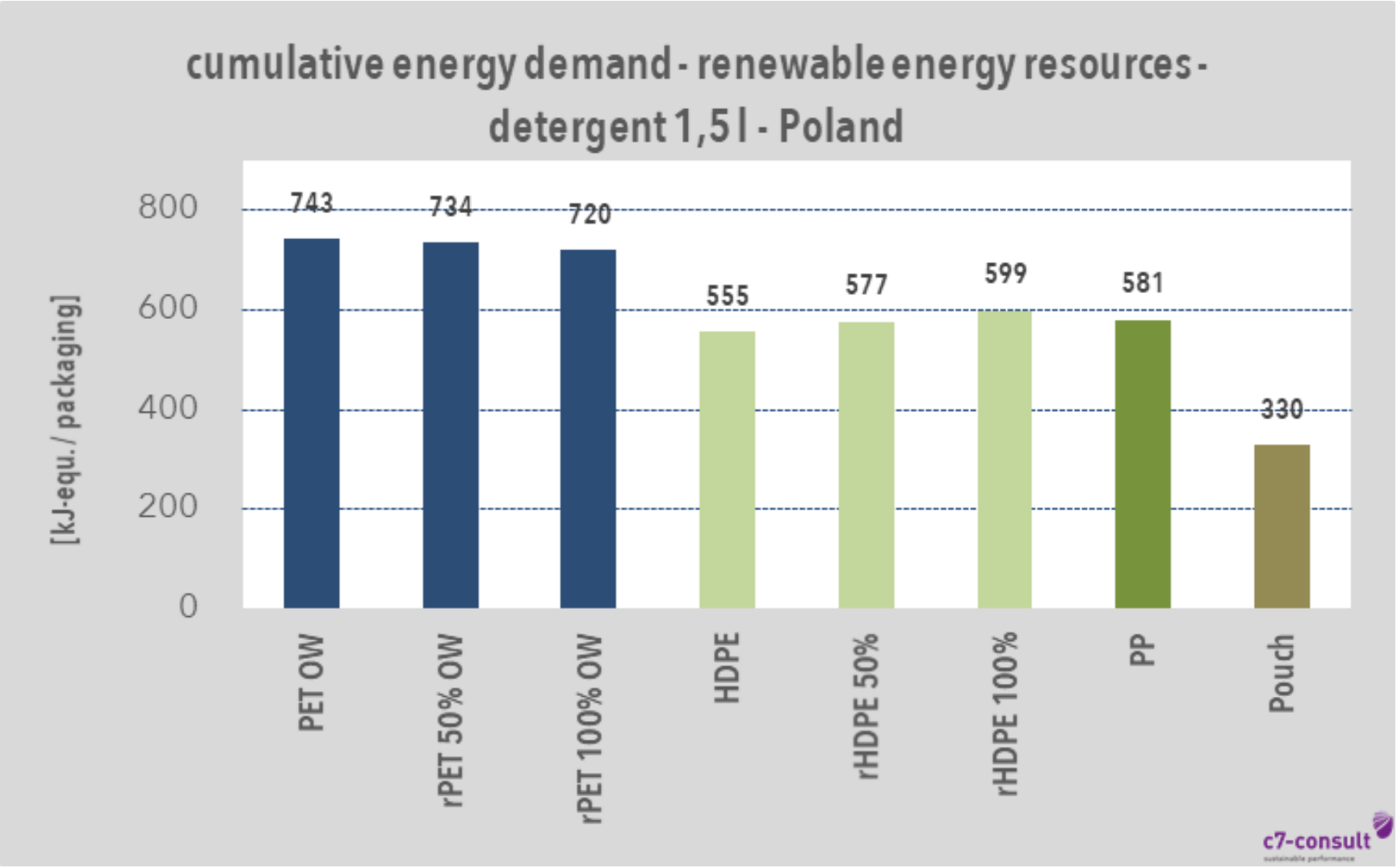
Liquid Detergent



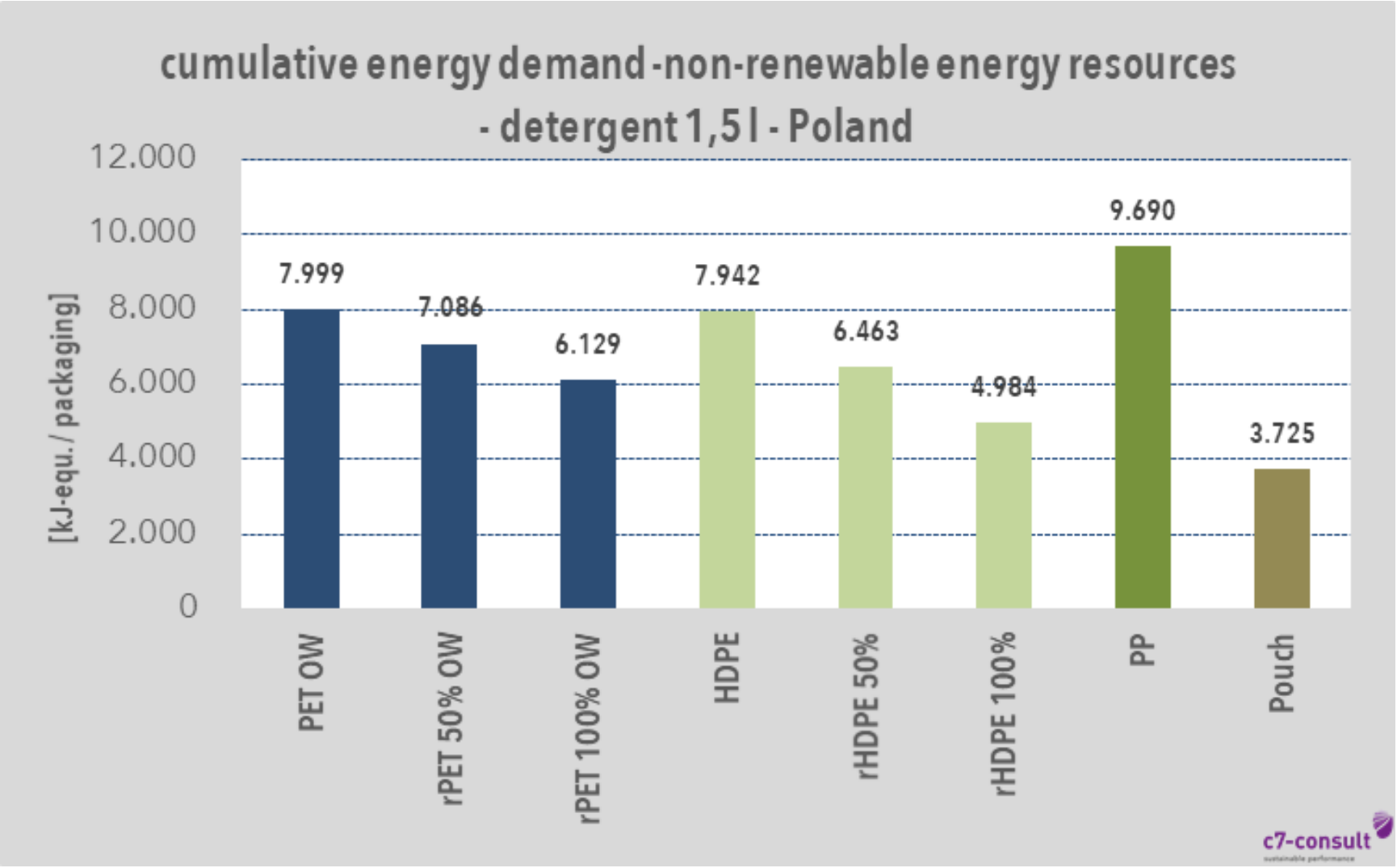
Liquid Detergent



Liquid Detergent



Liquid Detergent



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Summary

Summary

- The reusable PET bottles for water and carbonated soft drinks that were examined perform best. Reusable PET bottles use about 50 % more water than single-use PET bottles.
- Single-use PET bottles for water and juice have advantages compared to reusable glass bottles. For carbonated soft drinks these bottles show similar results, whereas for beer reusable glass bottles perform better than single-use PET bottles.
- For milk, HDPE bottles perform better than the comparable single-use PET packaging unit. Single-use PET bottles and the examined beverage carton are neck and neck. A beverage carton with a simpler head section can perform much better.

Summary

- Single-use PET bottles and the reusable glass bottle show for juice similar environmental impacts with advantages for PET bottles with higher share of recyclates.
- There is a clear environmental winner among the various types of beer packaging. The reusable glass bottle performs best, the aluminium can has slightly higher environmental impacts than the single-use PET bottles.
- PET is the clear winner when it comes to packaging units for food.
- For liquid detergent packaging the PP refill pouch performs best. HDPE bottles have lower impacts to the environment than PET bottles.
- For ketchup PET bottles show higher results than HDPE bottles and similar results compared to the PP bottle. The single use glass has always the highest environmental impacts.
- The single-use glass bottle is the least environmental packaging unit of all the contents examined. Only the tinplate can for food has even higher environmental impacts than the single-use glass bottle.

DANKE
für Ihre Aufmerksamkeit!

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