A·I·S·E

International Association for Soaps, Detergents and Maintenance Products

RUCODEM

LAUNDRY DETERGENT POWDER COMPACTION

VOLUNTARY INDUSTRY INITIATIVE FOR ROMANIA 2021 – 2024
CLOSEOUT REPORT



01/06/2026

Prepared by Dr. C. Bessler

A.I.S.E. aisbl • Boulevard du Souverain 165 • 1160 Brussels • Belgium
Phone: +32 2 679 62 60 • Fax: +32 2 679 62 66 • Email: aise.main@aise.eu • VAT: BE 0538 183 615

Table of Contents

Table of Contents **2**

Executive summary **3**

Key achievements **4**

Introduction and background **5**

Scope **7**
Products *7*
Geographical *7*
Participating companies *7*

PREP P RO commitments **8**
Recommended dosage *8*
Packaging *8*
Communication *9*

Quantification of detergent tonnage reduction **14**
Methodological considerations *14*
Market dynamics *14*
Benchmark tonnage *16*
Tonnage reduction *18*

Quantification of environmental achievements **19**
Methodology: environmental benefits per kg of detergent *19*
Estimated environmental benefits of PREP P RO compaction *22*

Annex 1 – PREP P RO Project Description **23**

Executive summary

The voluntary industry initiative “Product Resources Efficiency Project Powders Romania” (PREP P RO) aimed to reduce the environmental impact of heavy-duty powder detergents for household laundry in Romania, through product compaction. This project was initiated, promoted and deployed by RUCODEM with the support of A.I.S.E. (the International Association for Soaps, Detergents and Maintenance products). This was done under full transparency, making participation entirely voluntary, as well as open to any company wishing to participate - whether a member of the association or not.

PREP P RO ran for three years from March 2021 until February 2023 and covered Romania. The main commitment of the initiatives was a compaction of the laundry detergent powder, leading to a reduction of the standard recommended dose down to maximum 75 g/wash (and 115 ml/wash) achieving the same level of compaction as most of the countries in the European Union, also known as for PREP-P3-Level. In parallel, packaging had to be reduced proportional to the dosage reduction. To ensure correct product use, clear communication of the dosage changes had to be implemented on pack, by means of standardised visuals.

The laundry powder detergent tonnage reduction achieved by this initiative was estimated by comparing the actual tonnage after the full implementation of the initiative, with the extrapolated benchmark tonnage, as if the dosages had remained constant at the pre-compaction level. This fairly complex methodology was required because of the substantial dynamics in the detergent market during the execution of this project. Most importantly, the shift over time from powders to other forms made it impossible to interpret the extent to which an observed tonnage reduction had been the result of compaction - or rather of market dynamics. Using accurate data about individual producers’ dosage and market share (which were handled using, essentially, a black-box mechanism), relevant extrapolations could be made. Further, the calculation took into account the reality that on the one hand, dosage reductions were also implemented by several companies who had not signed up to the voluntary agreement. On the other hand, some consumers may - at least initially - have continued dosing intuitively at the same level as before, rather than according to the on-pack instructions.

It must be emphasised that multiple assumptions were made and that the available data had inherent limitations. Hence, while the calculated tonnage reductions are reasonable estimates, they cannot be considered as exact figures.

Compared to the 2021 dosage situation, the annual laundry powder detergent tonnage reduction achieved by 2023, through PREP P RO, is estimated to be 5212 tonnes per year in Romania. This is a reduction by about 12,2%. Since the implementation of the initiative, an estimated cumulative tonnage reduction of nearly 15636 tonnes had been achieved by the end of 2024.

The laundry powder detergent tonnage reduction leads not only to less use of detergent chemicals but also has important environmental benefits. By 2023, the annual reduction of greenhouse gas emissions is estimated to be 4.743 tonnes of CO_2eq/year. This corresponds with over 102.2 million km driven with an average new passenger car in Romania. The packaging waste reduction is estimated at over 83.307 tonnes per year. This can be visualised as the content of 1350 Olympic swimming pools filled with crushed waste, every year. The estimated annual truck transport reduction is 16.7 million tonne.km per year. This is equivalent to 862 journeys of a heavy truck all the way from Constanta to Satu Mare - or over 18 times around the earth.

Key achievements

	PREP P RO
Deployment	2021 – 2023
Dosage reduction to max.	75 g/wash 115 ml/wash
Annual detergent tonnage reduction	5212 tonnes/year
Total Detergent tonnage reduction	Nearly 15636 tonnes in total by the end of 2024
Greenhouse gas reduction	4.743 tonnes of CO_2eq/year = 102.2 million car kilometres
Packaging waste reduction	83.307 tonnes per year = 1350 Olympic swimming pools
Transport reduction	16.7 million tonne.km per year = 18 times around the earth with a heavy truck

Introduction and background

Over the past decades, stepwise, the laundry detergents industry has been reducing the volume and weight of washing powders needed per laundry load. In the 1970s, a typical standard dose was in the order of 275 grams per wash. This was gradually reduced to reach values of about 175 grams per wash by the 1990s. Around that time, in parallel with the 'regular' powder detergents, so-called 'compact' laundry powders appeared in some markets, to be dosed at around 100 grams per wash. Subsequently, several voluntary initiatives through A.I.S.E. contributed to further compaction of the 'regulars', with the standard dosage now at or below 75 grams per wash for all detergent powders.

From 2009 until 2012, RUCODEM participated in the implementation in Romania of the voluntary initiative A.I.S.E. LSP-2 for heavy duty household laundry powder detergents, similar to other national member associations of A.I.S.E. which in turn have implemented the voluntary initiative in those countries.

From 2012 until 2014 the voluntary A.I.S.E. initiative PREP-P3 was conducted that further reduced the recommended dose of heavy-duty household laundry powder detergent to 75 g per wash.

PREP-P3 was not adopted in Romania back then, while the rest of Europe (all of Western Europe and the Central European countries Bulgaria, Czech Republic, Hungary, Poland and Slovakia) adopted it.

As the Romanian market has since evolved, and having as an example the voluntary initiatives of the A.I.S.E. in the field of sustainability ("Code on Good Environmental Practices", LSP, PREP) and stimulated by the positive impact on the environment of the "Laundry Sustainable Project " (LSP 1 Initiative implemented in Romania in 2006), RUCODEM considered it appropriate to continue efforts extending the sustainability benefits of this type of voluntary initiatives in the field of laundry detergents, with a significant positive impact on the environment.

Therefore, RUCODEM proposed to take a new step in this direction by launching a project of voluntary initiative on a category of products still of great relevance to consumers, namely "heavy duty low foam detergents" (Heavy Duty Low Suds - "HDLS") used in the household. As a consequence, the PREP P RO was initiated, opened on March 1, 2021, for two years and closed on February 21, 2023.

This initiative came within the framework of A.I.S.E.'s agenda for sustainability and the industry's commitment to reducing the environmental impact of detergents[1]. The first initiative in this area was the A.I.S.E. "Code of Good Environmental Practice" (which became a European Commission Recommendation - 98/480/EC) and the associated "Washright" campaign. Building on the positive outcome of the "Code" and wanting to continue along the lines of delivering measurable sustainability benefits in the area of laundry detergents, in 2006 A.I.S.E. launched its first "Laundry Sustainability Project" (LSP-1), which focussed on powder detergents for household laundry. Although it was open in virtually all European countries, its focus was on the Central and Eastern European region, where the "Code" had not been implemented. In 2008, the members of A.I.S.E. recognized the value of continuing along this route and initiated two new parallel initiatives. One aimed once more at powder detergents (LSP-2, as covered in this closeout report). The other addressed for the first time the category of household laundry liquid detergents (LSP-L, see separate closeout report).

PREP P RO is similar to A.I.S.E. PREP-P3 both in terms of the environmental objective pursued by the voluntary initiative (continuing to provide significant benefits in terms of sustainability in the field of laundry washing in households), in terms of compatibility with the A.I.S.E. Charter. - as the main sustainability framework and as the "most advanced sustainability scheme for industry" of the A.I.S.E., as well as on the manner and timing of the implementation of the voluntary initiative.

This closeout report presents and analyses the results of the "RUCODEM Product Resource Efficiency Project for Laundry Powder Detergents for Romania" (PREP P RO)[2]. This was a voluntary industry initiative following the footsteps of the voluntary industry initiatives launched by A.I.S.E.[3] PREP-P3 aimed to further reduce the environmental impact of heavy-duty laundry powder detergents for

[1] See www.aise.eu – (Our activities > Sustainable Cleaning > Product Resource Efficiency Projects).

[2] See in Annex 2 the Project Description document for the "A.I.S.E. Product Resources Efficiency Project for Laundry Powder Detergents PREP-P3".

[3] A.I.S.E. - Association Internationale de la Savonnerie, de la Détergence et des Produits d'Entretien - the International Association for Soaps, Detergents and Maintenance Products.

household laundry, promoting sustainable production and consumption via the concentration of such products together with adequate consumer information.

This report covers the results of the PREP P RO initiative in the period from 2021 (base-line reference year) until 2023. It presents the sustainability benefits achieved in the total region in terms of reduction of raw materials, packaging materials, greenhouse gas emissions, and transport.

Please note that to calculate the total tonnage reductions, potentially sensitive information was obtained from the participating companies (e.g. individual product dosage) and from external data providers (e.g. individual market shares). These data were aggregated by RUCODEM in the calculations and are not included individually in this report. Moreover, for clarity, participating companies did not have access to the data of other participating companies; in order to avoid any potential sensitive exchange of information and such data were aggregated at RUCODEM level, similar to a black-box mechanism.

Scope

Products

The PREP P RO initiative was aimed at all heavy-duty[4] low suds laundry powder detergents used for household laundry. In addition, laundry powder detergents targeted to the Industrial & Institutional (I&I) sector but sold in Cash & Carry markets, and thus easily available to consumers, were also within scope of the initiative.

Geographical

Geographically, PREP P RO was deployed in Romania.

Participating companies

While open to any companies present in the Romanian powder detergents market, participants included large multinational companies (Table 1).

Table 1. Participating companies

PREP P RO participants
Henkel
Procter & Gamble
Unilever

[4] "Heavy Duty" according to EU Regulation (EC) No 648/2004, Annex VIIB: "a detergent shall be considered to be a heavy-duty detergent unless the claims of the manufacturer predominantly promote fabric care i.e. low temperature wash, delicate fibres and colours."

PREP P RO commitments

Recommended dosage

For all their heavy-duty household laundry powder detergents, companies who signed up to PREP P RO committed to a standard recommended dosage[5] not greater than 75g and 115ml per wash (Table 2).

Table 2. Recommended dosage

Maximum recommended dosage for a standard wash, normal soil level, medium water hardness	*PREP P RO*
g/wash	75
ml/wash	115

PREP P RO, aimed to further reduce the dosage from the LSP-2 level implemented in Romania in 2014 down to a more ambitious target. Importantly when used at these lower dosages, detergents should deliver wash results equivalent to what the consumer is expecting from previous experience.

The maximum limit of 75g per wash were selected based the level of compaction achieved in other countries by PREP P3. This in turn was based on a broad industry consultation that confirmed the technical feasibility. It was therefore expected that the required thresholds could be reached with conventional technologies and did not represent a barrier to entry into the project for any company. On request, RUCODEM also offered expert assistance to companies asking for this, to prevent the possible exclusion of any company for technical reasons.

Packaging

As the compacted formulations lead to a reduced volume of detergent for a given number of wash loads, signatories to PREP P RO also committed to a reduction of packaging materials.

As a minimum, the packaging reduction had to be proportional to the extent of compaction of the detergent powder - in other words, keeping fill levels overall at least in line with levels prior to the compaction initiatives. This commitment applies to all packaging types (rigid, e.g. cartons, as well as non-rigid, e.g. bags).

For individual rigid containers, there was in addition the specific commitment to always have a fill level that is at least at 70% of the maximum filling ratio.

[5] As defined in Regulation (EC) No 648/2004, Annex VII - i.e. for a standard washing machine load, normal soil level, medium water hardness.

Communication

To reach the desired sustainability benefits, not only did the manufacturers have to develop more concentrated products, but also consumers had to adapt their dosing habits to the new dosage instructions.

On pack

As part of their commitment, signatories to PREP P RO were strongly urged to communicate clearly to consumers how to correctly use the new products, i.e. to apply the correct dosage. Communication to consumers had to also focus on raising awareness about the benefits of using more compacted products.

For this purpose RUCODEM used non-branded material for on pack communication, developed by A.I.S.E., made available to all participating companies. These are shown in Figure 1.

The execution depending on the shape of the dosing device. The words “More Concentrated” or “Concentrated” was translated to “Mai concentrat” and “Concentrat” respectively- Also ‘silent’ options were allowed instead of the monolingual versions shown below.

“Top of the pack” patch:



patch to be added to the “Dosing Table”:

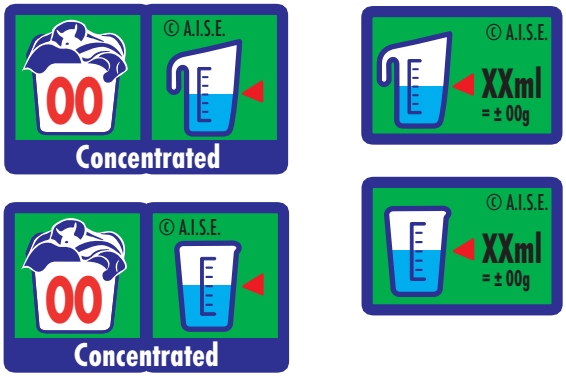

Figure 1. On-pack material for PREP P RO

RUCODEM/ A.I.S.E. campaign

In the context of PREP P RO, a series of leaflets were developed by RUCODEM in collaboration with A.I.S.E.















Figure 2. Leaflet for PREP-P3

Rucodem TV Campaign

For the communication to the end consumer, a TV campaign was developed informing viewers about the compaction, its sustainability benefits, how to identify compacted detergents and how to dose appropriately. In Figure 3 through Figure 6 the main scenes of the short, 6s-version are shown. Also, a long, 30 s version was developed.



Figure 3: RUCODEM TVC 0:00 min



Figure 4: RUCODEM TVC 00:02 min



Figure 5: RUCODEM TVC 0:03 min



Figure 6: RUCODEM TVC 0:05 min

Quantification of detergent tonnage reduction

Methodological considerations

As consumers apply a lower dosage for the majority of the powder detergents on the market, thanks to compaction, this contributes to a notable reduction of the overall tonnage of powder detergents sold across the market.

In absence of any other market dynamics than compaction, one could simply make a direct comparison between the total powder detergents tonnage just before compaction, and the total tonnage just after compaction. The difference between both tonnages would then be the tonnage reduction that can be attributed to compaction. However, this straightforward approach is not applicable, because other substantial changes in the market have been happening in parallel. Hence, tonnage changes have not been a single-variable process:

- the overall automatic detergents market size has evolved, e.g. in Romania the market may have grown because of an increased standard of living (leading to more machine wash loads), or because of population growth;
- the preference for different forms of laundry products has changed, leading to an evolution in the powders share relative to the total market.

Consequently, to quantify the powder detergents tonnage reduction that can be attributed to the industry compaction initiative PREP P RO, a hypothetical calculated benchmark is needed. Indeed, it is necessary to separate the tonnage effect of compaction from the effect of other market dynamics.

Market dynamics

Powder detergents segment

In Figure 7, the tonnage trend for automatic detergent powders, with as reference the tonnage in the benchmark year 2021, is shown for Romania[6].

In 2021 the tonnage was 42175 tonnes/year in Romania and a clear reduction over time is observed of 5690 tonnes/year (13,5%)

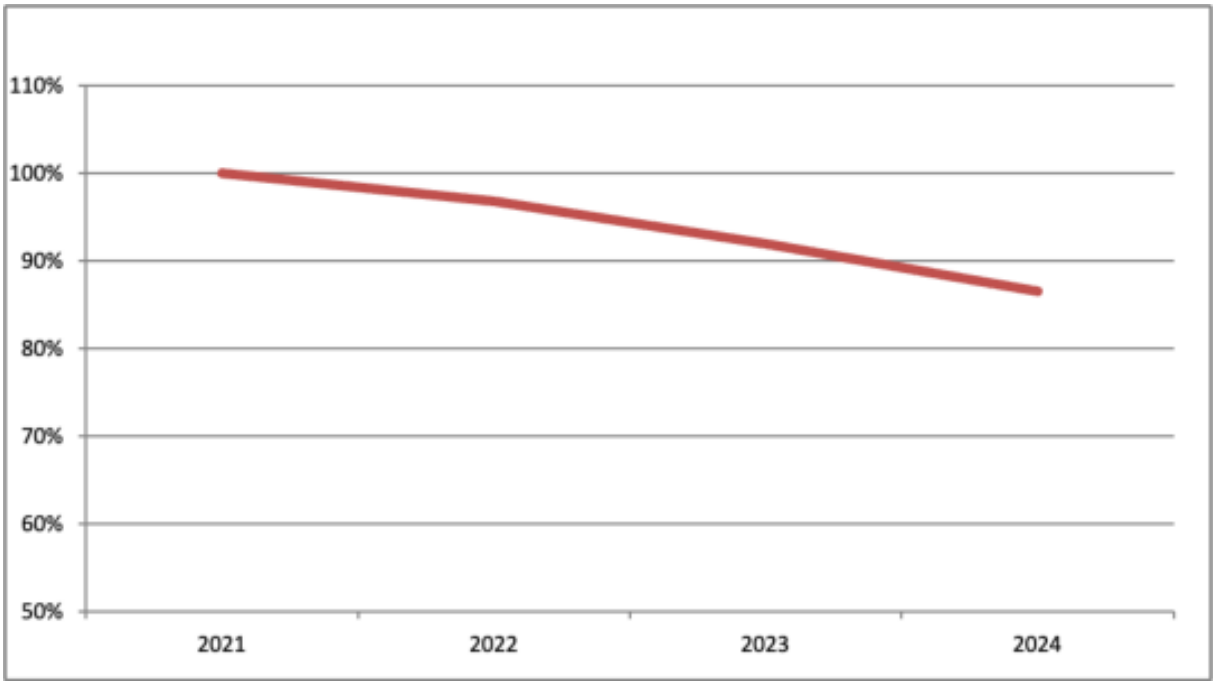

Figure 7. Laundry powders tonnage trend in Romania

[6] Passport, Euromonitor International 2025

When considering the reduction in the annual powder detergent tonnage, it is important to note that this was not only driven by the detergent dosage per wash, but also by the annual number of wash loads conducted with powder detergents, i.e. the segment size of powders in the overall laundry detergents market.

The powders segment size is determined (1) by the total automatic detergent market size (across all detergent forms) and (2) by the share of the powder form relative to other laundry detergent forms. During the period covered by the PREP P RO project, there has been an evolution in both of these factors - as discussed below.

Share of the powder form

Sales volume data of the different detergent forms are not available expressed in standard doses. As an approximation, the value share of the powder form might be used as an estimate of the proportion of laundry loads that are washed with powder detergent. However, it is to be taken into account that the retail value per dose may be different for different forms. Hence, with this approach, forms with a lower price setting per dose (as may well be the case for powders) would appear to have a lower share than what has actually been sold.

The powders value share has decreased in Romania between 2021 and 2024 (Figure 8). It went from close to 42% in 2021 down to 35% in 2024[7].

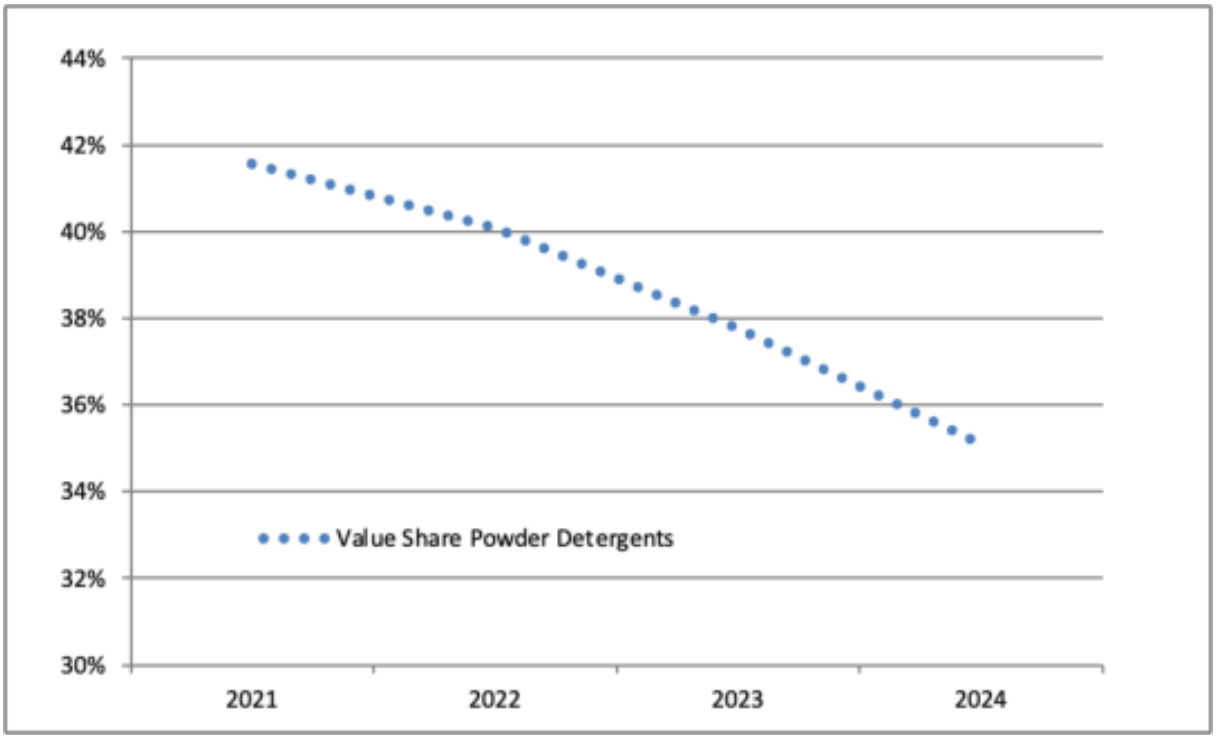

Figure 8. Laundry powders value share relative to total automatic detergents in Romania

Discussion

The overall detergent category volume and value trends between 2021 and 2024, as well as the ongoing decrease of the powders segment value share within the detergent category, indicate that multiple market dynamics have been occurring. Hence, the powders tonnage reduction has not been a single-variable process, purely attributed to compaction. While a quantitative reduction might be calculated from the tonnage trend data in isolation, these data are insufficient to determine the causal influence of compaction on detergent consumption.

[7] Passport, Euromonitor International 2025

Benchmark tonnage

Extrapolation from post-compaction tonnage

The hypothetical benchmark tonnage aims to represent the situation without compaction but with all other market dynamics in place. This benchmark is extrapolated from the actual tonnage after compaction, by re-scaling the latter, "reverting" the dosage reduction while maintaining the powders segment size as it was after compaction (Figure 9). This implies that only the amount of powder detergent equivalent to the number of laundry loads that were washed with powder at the time after compaction is considered. The fraction of laundry loads washed with powder detergent at the time before compaction, but that moved out of the powders market (e.g. due to a shift towards a different form) is disregarded. This is because that fraction did not contribute to a compaction related tonnage reduction.

Ultimately, the estimated tonnage reductions are calculated as the difference between the actual post-compaction tonnage and the extrapolated pre-compaction benchmark. For PREP P RO, this is 2024 versus 2021.

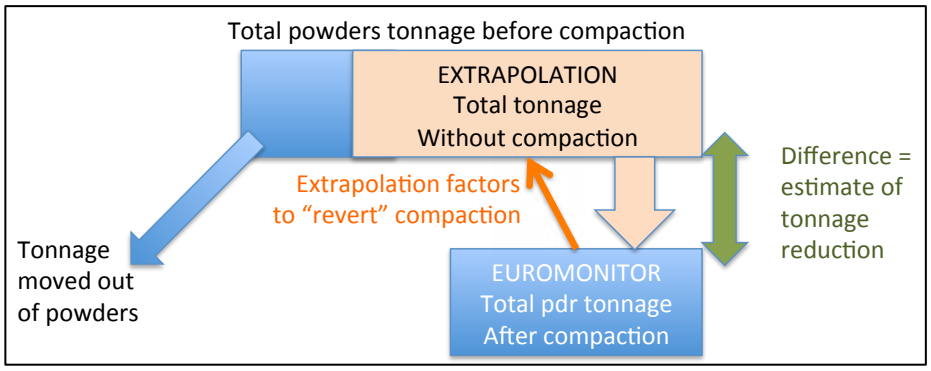

Figure 9. Pre-compaction benchmark tonnage

The annual tonnage of heavy-duty laundry detergent powders after compaction, in Romania, was obtained from the Euromonitor[8] database. This reflects the real market status in terms of the powders segment size and share after compaction.

An extrapolation was conducted, based on the dosage before compaction compared to the dosage after compaction. For this purpose, the average recommended dosage in the country was determined, as the weighted average across the individual company dosages, weighted by their market value share (available from Euromonitor). Recommended dosage was obtained from the producers[9], for the years 2021 through 2024. This reflects the situation before PREP P RO and during PREP P RO, respectively. Note that this exercise was limited to "branded goods" companies, because for private labels, no detailed value share information could be obtained.

To calculate the hypothetical "no compaction" benchmark tonnage, in addition, the following aspects were taken into consideration:

- A large percentage of the powders detergent market (more than 75% value share[8]) is covered by PREP P RO initiative signatories. In addition, many other detergent producers have followed suit, even though they did not join the voluntary commitment to compact. While this dynamic in the market is not formally related to the RUCODEM initiative, it can nevertheless be considered as a de facto consequence - and the resulting tonnage reduction is indirectly also an achievement of the initiatives. However, at least initially, one cannot assume that the entire market's dosage will have been modified.

[8] Passport, Euromonitor International 2025

[9] In case different brands of one company had different dosages, first the company's weighted average dosage (per country) was determined, based on the individual brands' market shares and dosages.

- Not all consumers dose their detergent according to the instructions on pack. In the A.I.S.E. "Habits & Practices" study of 2025[10], covering the entire EU, with 4600 panellists, 71% of the respondents are aware of the dosing instruction on pack. However, 26% of the consumers usually add less detergent than recommended and 28% add more detergent than recommended.

Based on the above considerations, it is assumed that 50% of the total considered powder detergent tonnage (across all producers) will have undergone a dosage reduction[11]. For the other 50%, it is conservatively assumed that consumers did not reduce dosage - either because their particular brand of detergent was not compacted, or because they dose intuitively rather than by following the instructions.

This is illustrated in Figure 10.

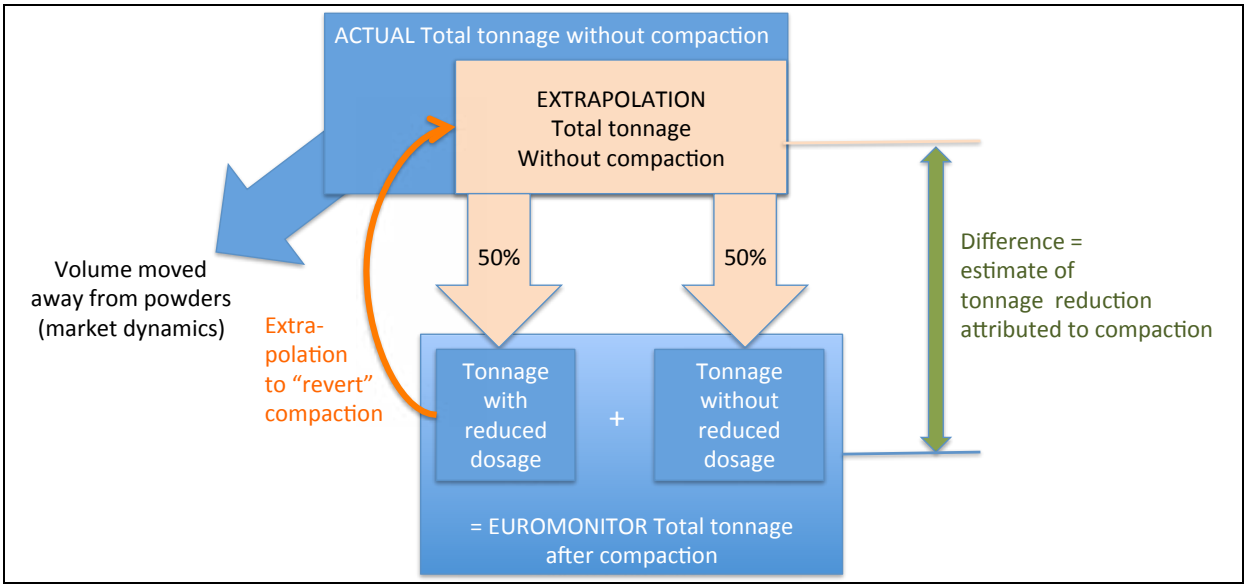

Figure 10. Methodology to quantify tonnage reduction attributed to compaction

Applying this assumption, the hypothetical "no compaction" tonnage for each country was determined as follows[12]:

$$tonnage^{actual}_{after\ compaction} = 50\% \cdot tonnage^{extrapolated}_{before\ compaction} + 50\% \cdot tonnage^{extrapolated}_{before\ compaction} \cdot \frac{dosage_{new}}{dosage_{old}}$$

$$\Rightarrow tonnage^{extrapolated}_{before\ compaction} = tonnage^{actual}_{after\ compaction} \cdot \frac{2}{1 + \frac{dosage_{new}}{dosage_{old}}}$$

It is emphasised that the "no compaction" tonnage aims to represent a reasonable estimate. Due to the multiple assumptions and limitations, it cannot be considered and an accurate tonnage calculation.

Alternative approach - not retained

An alternative approach would be to start from the actual laundry powder tonnage before compaction, and to re-scale this tonnage to take into account the market dynamics that took place during the time compaction was implemented. For example - if the tonnage before compaction had been 1000000

[10] Cleanliness & hygiene – Consumers' understanding and washing & cleaning habits at home 2025. https://aise.eu/app/uploads/2025_AISE-consumer-research_report-summary.pdf

[11] Consensus decision by the A.I.S.E. PREP Task Force, February 9th, 2018

[12] For the PREP P RO assessment, $dosage_{old}$ is the dosage in 2021, while $dosage_{new}$ is the dosage in 2024.

tonnes/year, and it is known that 25% of the powders market moved to a different form, then the extrapolated benchmark tonnage would be 750000 tonnes/year.

In absence of other data, it was attempted to conduct this extrapolation based on the powder segment's market value (inflation-corrected). The underlying assumption is that the market value of powders would be directly correlated to the number of wash loads conducted with powders - i.e. a constant market value per dose over time (except for inflation) is assumed.

Unfortunately, this approach did not lead to plausible findings. Most likely this is because market dynamics had been more complex and thus, the value per dose had not remained constant over time.

Tonnage reduction

The results are presented in Table 3. These are estimates, based on multiple assumptions - not exact calculations.

It is estimated that PREP P RO has led to a powder detergent tonnage reduction by 5212 tonnes per year in Romania, which is 12,5% of the non-compacted benchmark.

Table 3. Tonnage reduction attributed to PREP P RO (2024 vs. 2021 dosage)

actual powders tonnage (tonnes/year)	*"no compaction scenario" tonnage (tonnes/year)*	*tonnage reduction (tonnes/year)*	*% reduction vs. total tonnage without compaction*
36484	41696	5212	12.5%

Discussion

For PREP P RO no quantitative target had been included in the project description. Instead, it was written that "*Based on existing A.I.S.E. experience ... we can expect a significant level of sustainability (sustainability) and following the implementation of the PREP P RO initiative*"

Previous activities in Europe, mainly the LSP-2 and the PREP-P3 led to an overall reduction of 15% in the timespan from *2008 until 2015 compared to the respective non-compaction scenario. In this light, a 12,5% reduction in only 2 years, namely between 2021 and 2024 is noteworthy.*

During the PREP-P3, other Central European countries have reduced their dosage by 12,2% on average in a three-year timespan. Western European countries contributed a 9,4% reduction.

Quantification of environmental achievements

Methodology: environmental benefits per kg of detergent

The environmental benefits are quantified relative to each kg of detergent that is avoided thanks to compaction.

Carbon footprint: 2.3 kg CO_2eq emissions avoided per kg of detergent

Compacted detergents contain a lower amount of ingredients per wash, which results in energy savings at most of the detergent's life cycle stages. Consequently, this leads to a reduction of the carbon footprint of the detergents.

In an ISO-compliant LCA study by PRé Consultants (2014)[13], the environmental impact of powder laundry detergents has been quantified as 580 g CO_2eq per wash, cradle to grave, with a detergent dosage of 81.5 g/wash. However, this assessment includes the determination of the carbon footprint for each of the life cycle stages: ingredient production, detergent formulation (processing), packaging, transport, use phase (washing machine), and end of life. These different stages need to be considered individually to assess the applicability of the carbon footprint values to determine the environmental benefits of compaction.

1) Ingredient production

The formula design strategies used by individual companies are strictly confidential. They are different for each producer. Further, they may also be different at the brand and variant level. As a general principle, initial steps in detergent compaction were mainly achieved by a reduction in the amount of inert filler (mainly sodium sulphate). However, the more recent compactions required more complex reformulation strategies, impacting most of the key ingredients. Consequently, as an approximation, a reduction of the overall detergent chemistry was assumed[14].

The carbon footprint of a powder laundry detergent's ingredients is reported to be 127 g CO_2eq per wash - equivalent to 1.558 kg CO_2eq per kg of detergent.

2) Formulation, packaging, transport and end-of-life

The carbon footprint during a powder laundry detergent's formulation, packaging, transport and later on its end-of-life, combined, was calculated to be 62 g CO_2eq per wash - equivalent to 0.761 kg CO_2eq per kg of detergent. This is independent of the detergent formula as it is purely driven by the amount of material. Hence, the emission value is directly applicable for the quantification of compaction-related savings.

3) Use phase

The consumer use phase is to be excluded from the assessment of compaction benefits. The environmental impact of the use phase (washing machine) is driven entirely by the amount of water used in the machine and how much energy is used to heat the water. As such, the detergent's degree of compaction has no influence on the use phase.

4) Carbon footprint reduction thanks to compaction

The reduction in carbon footprint thanks to compaction consists of the savings related to the use of less ingredients (1.558 kg CO_2eq per kg), and the savings achieved further downstream the life cycle thanks

[13] PRé Consultants. A.I.S.E Screening LCAs for Cleaning Products in Europe Compact powder and tablet laundry detergents. Report for A.I.S.E. February 2014.

[14] Consensus opinion by the A.I.S.E. PREP Task Force, February 9th, 2018.

to the use of less material (0.761 kg CO_2eq per kg). In total, 2.319 kg CO_2eq emissions are avoided for every kg of detergent that is avoided thanks to compaction.

5) Carbon footprint benchmarks

Greenhouse gas emissions are expressed as carbon dioxide equivalents (CO_2eq). To allow a more tangible interpretation, these values can be compared to greenhouse gas emissions of common activities (Table 4).

Table 4. Greenhouse gas emission benchmarks

Activity	*Emission*	*Source of the information*	*Equivalent per kg of detergent*
Emission of driving an average new passenger car	118.1 gCO_2eq/km	ACEA[15], average emission of new cars sold across the EU in 2016	19.6 km by car
Emission of driving an average new passenger car in Romania	126.5 gCO_2eq/km	ACEA[16], emission of new cars sold in Romania in 2021	18.3 km by car
Emission of the production of 1 kg of beef	46.2 kgCO_2eq/kg	FAO[17] - Greenhouse gas emissions from ruminant supply chains - a global life cycle assessment	50.2 g of beef
Emission of the production of 1 kg of beef rump steak prepared	31.3 kg CO_2eq/kg	FAO[18]- Integration of environment and nutrition in life cycle assessment of food items: opportunities and challenges	74 g of beef rump steak prepared
Average EU household carbon footprint	11 tonnes CO_2eq/cap/year	Ivanova et al., 2017[19]	7.7% of one person's daily carbon footprint
Average RO household carbon emission	6 tonnes CO_2eq/cap/year	Climate Action Progress Report 2023 Country profile Romania[20]	14.1% of one person's daily carbon footprint

Transport savings: 3.2 tonne.km truck transport avoided per kg of detergent

Compacted detergents require less raw material to be transported into the detergent plants, and less finished product to be transported to retailers. This results in important transport savings.

In the 2014 LCA study[13], it was assumed that detergent ingredients (except renewable surfactants) are transported by truck over a distance of 2000 km from the supplier to the detergent production plant. Further it was assumed that from the detergent production plant to the retailers, on average there is a

[15] http://www.acea.be/statistics/tag/category/co2-emissions-trends accessed 23/10/2017

[16] http://www.acea.be/statistics/tag/category/co2-emissions-trends accessed 24/07/2025

[17] http://www.fao.org/docrep/018/i3461e/i3461e.pdf accessed 23/10/2017

[18] https://openknowledge.fao.org/server/api/core/bitstreams/b881d890-f90b-435e-8af2-24b19e342a11/content accessed 24/07/25

[19] Diana Ivanova, Gibran Vita, Kjartan Steen-Olsen, Konstantin Stadler, Patricia C Melo, Richard Wood and Edgar G Hertwich (2017). Mapping the carbon footprint of EU regions. Environ. Res. Lett. 12 (2017) 054013

[20] https://climate.ec.europa.eu/document/download/7c59d7a3-2602-4a2f-8072-df544554a13d_en?filename=ro_2023_factsheet_en.pdf accessed 24/07/25

transport of 1200 km by truck. Transport from the retailer to the consumer was not taken into account, because of the minimal impact and because compaction would anyhow not change the number or distance of shopping trips.

Re-applying these same assumptions, each kg of detergent that is avoided thanks to compaction leads to an avoidance of truck transport of 3200 km x 1 kg = 3.2 tonne.km. This is equivalent to 0.145 km driven by a heavy truck with a typical load[21] of 22 tonnes.

Packaging savings: 13.28 g of packaging avoided per kg of detergent

Compacted detergents (meeting the commitments of PREP P RO) require less packaging material, because the fill level of the packs was to be at least equivalent to the fill levels prior to compaction.

The prevalent packaging type in Romania are bags of flexible film. These are palletized with shrink wrap polyethylene.

Based on the information provided by the participating companies, a kg detergent required 9,28 g of plastic film packaging on average in 2024.

In the 2014 LCA study[13], it was assumed that one dose of powder detergent (81.5 g) requires 0.33g of shrink wrap polyethylene. This corresponds to 4 g of polyethylene per kg of detergent.

Assuming that the amount of packaging per kg of detergent will remain largely the same upon compaction, the avoidance of packaging material per kg of avoided detergent is 9.28 g of plastic film and 4 g of polyethylene, or 13.28 g combined.

[21] For consistency, assumptions were reapplied from the Closeout Report - A.I.S.E. Laundry Sustainability Project # 1 for Heavy Duty Low Suds Laundry Powder Detergents (LSP-1) (December 2009).

Estimated environmental benefits of PREP P RO compaction

The environmental benefits are directly proportional to the reduction in detergent tonnages.

The benefits below are intended to be reasonable estimates - not exact calculations.

Climate

In Romania PREP P RO resulted in an estimated greenhouse gas reduction by 4.743 tonnes of CO_2eq every year.

The annual greenhouse gas reduction corresponds with over 102.2 million km driven with an average new passenger car in Romania, or with the production of over 261.6 million kg of beef. It is equivalent to the carbon footprint of more than 431 people every year.

Waste

The estimated annual packaging savings amount to over 83.307 tonnes/year, of which 76% are plastic reduction and 24% cardboard reduction. This is equivalent to the weight of almost 14 African Bush Elephants. This is equivalent to slightly less than 4 truckloads of a 22-tonne truck. The volume of the reduced packaging would fill 1350 Olympic size swimming pools up to the brim.

Transport

Thanks to the PREP P RO compaction, truck transport of detergent raw materials and finished products was reduced - estimated by about 16.7 million tonne.km every year.

This equates to 750,091 km with a heavy truck (of 22 tonnes) and can be visualised as 862 trucks driving across Romania from Constanța to Satu Mare. (Figure 11).

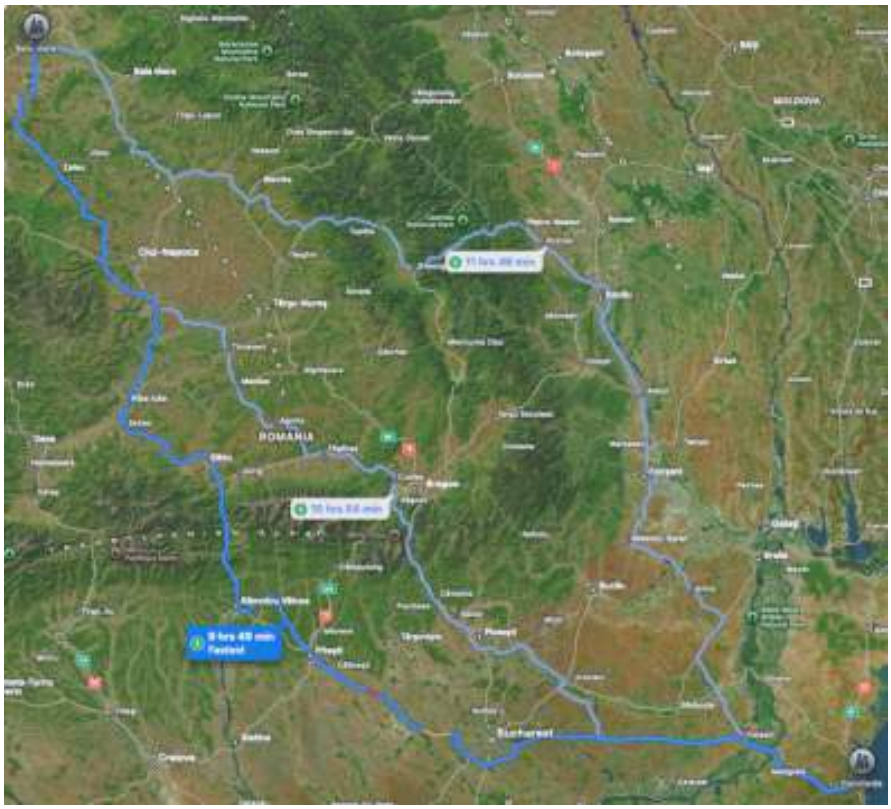

Figure 11. Transport savings per region, visualised as truck journeys (of 862 heavy trucks).

These estimated savings are also equivalent to one heavy truck (of 22 tonnes) not having to drive more than 18 times around the earth's circumference, every year.

Annex 1 – PREP P RO Project Description

The PREP P RO project description can be found on the RUCODEM web site:

"Project/ Voluntary Initiatives" ➔ "RUCODEM voluntary initiative regarding the

Product Resources Efficiency Project for Powder Laundry Detergents – PREP P RO" ➔ "Project Description (in Romanian language)"

The direct link is:

https://www.rucodem.ro/wp-content/uploads/2021/06/2021-06-22_PREP-P-RO_Descrierea-proiectului.pdf