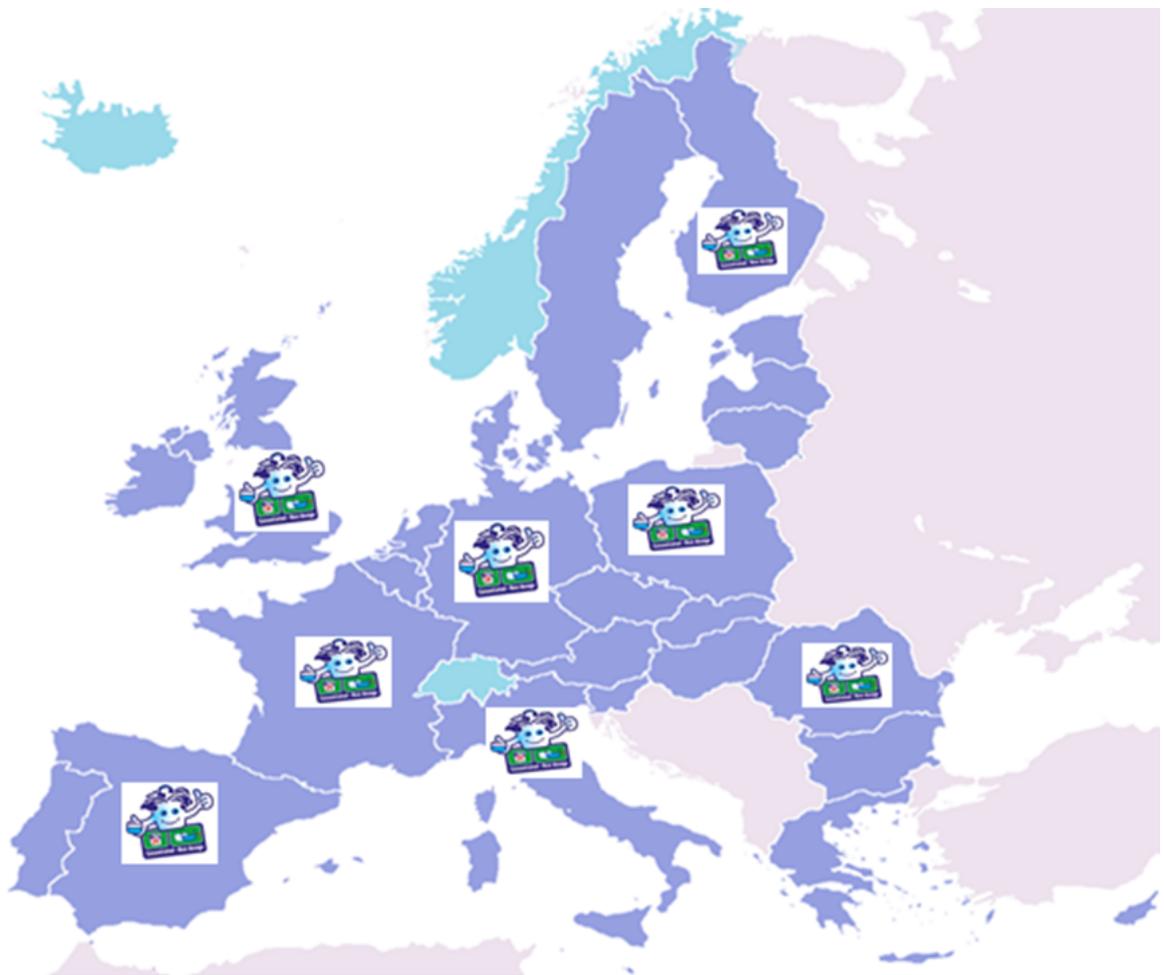


A.I.S.E. LAUNDRY SUSTAINABILITY PROJECT FOR HEAVY DUTY LAUNDRY LIQUID DETERGENTS (LSP-L)

CLOSEOUT REPORT



June 4th, 2018
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Executive summary

This report presents the results of the *LSP-L* initiative, which aimed to reduce the environmental impact of Heavy Duty Low Suds (HDLS) Liquid Detergents for household laundry in the European Union. *LSP-L* was initiated, promoted and deployed by A.I.S.E. (International Association for Soaps, Detergents and Maintenance products) with the support of its National Associations partners. 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. A.I.S.E. also offered technical assistance on request to any company asking for it, to prevent possible exclusion of companies for technical reasons.

LSP-L was opened in July 2009, and implemented during one year from July 2010 until June 2011. It covered the European Union in addition to the four countries of the European Free Trade Association. The main commitment of the initiative was a compaction of liquid laundry detergents leading to a reduction of the standard recommended dose down to maximum 75 ml/wash. The product scope included traditional liquid detergents as well as mono-dose capsules. Companies also committed to a reduction of packaging materials, to keep fill levels (as a minimum) in line with the situation before compaction. To ensure correct product use, clear communication of the dosage changes had to be implemented on pack, by means of standardised visuals.

The liquid laundry detergent tonnage reduction achieved by this initiative was estimated by comparing the actual tonnage after the full implementation of compaction, with the extrapolated “no compaction” benchmark tonnage. This benchmark was obtained by extending the observed tonnage trend of the years before the initiative, beyond the time when *LSP-L* was implemented (and caused a tonnage decrease). This approach, which is based on the actual shift in consumer behaviour, considers that the entire tonnage reduction was driven by the *LSP-L* initiative, even though the initiative’s signatories did not cover about 25% of the market. However, it is fair to assume that the dosage reductions implemented by companies who had not signed up to the voluntary agreement, were put in place because de facto they followed suit.

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 dosage situation before *LSP-L*, the annual liquid laundry detergent tonnage reduction achieved by 2012, is estimated to be 310000 tonnes per year across Europe - a reduction by over 20%. This was mainly (for 95%) achieved in four key countries (France, Italy, The Netherlands and Spain) thanks to the size of the dilute liquid detergent segment, the full conversion to the compact form, and consumers’ adoption of the new dosing habits. As an aside, it should be noted that in many other countries the liquid detergents market had already been converted to the compact form prior to *LSP-L* - as consequence, in these countries, the initiative had no meaningful further impact. Now, across Europe, the liquid detergents market is almost entirely in the compact form.

As the assessment is based on actual detergent volumes in the market, these findings support the hypothesis that consumers were aware of compaction, and have modified their dosing habits accordingly. Indeed, the observed tonnage reductions could not have been achieved without a reduced product consumption per wash by the consumer.

The liquid laundry detergent tonnage reduction has important environmental benefits. By 2012, the annual reduction of greenhouse gas emissions is estimated to be 62000 tonnes of CO₂eq/year. This corresponds with over 500 million km driven with an average new passenger car. The packaging waste reduction is estimated at over 25000 tonnes per year. The estimated annual truck transport reduction is 372 million tonne.km per year. This is equivalent to 425 times around the earth with a heavy truck.

Importantly, the beneficial effects of *LSP-L* have continued over time, beyond the life time of the initiative. The detergent tonnage reduction initiated by *LSP-L* has led to further savings year after year. As a result, across the years between 2010 and 2015, the cumulative saving amounted to over 1.8 million tonnes of detergent.



Key achievements

	LSP-L
Deployment	2010 - 2011
Dosage reduction to max.	75 ml/wash
Detergent tonnage reduction	310000 tonnes/year
Greenhouse gas reduction	62000 tonnes per year
Packaging waste reduction	25000 tonnes per year
Transport reduction	372 million tonne.km = 425 times around the earth with a heavy truck



Introduction and background

This closeout report presents and analyses the results of the “**A.I.S.E. Laundry Sustainability Project for Heavy Duty Low Suds Laundry Liquid Detergents**” (**LSP-L**)¹, a voluntary industry initiative launched by A.I.S.E., which aimed to reduce the environmental impact of Heavy Duty Low Suds (HDLS)² liquid³ detergents for household laundry, thus promoting sustainable production and consumption via concentration of such products together with adequate consumer information.

More specifically, **LSP-L** aimed to provide:

- In the field of sustainable production, a reduction of the environmental impact of the laundry detergent sector across the whole of Europe by promoting and encouraging the reduction of chemicals, packaging and energy used in product making, delivery and use, thus contributing to sustainability targets such as CO₂ emissions.
- In the field of sustainable consumption, an encouragement to consumers to optimize further the way they use products, through harmonised on-pack consumer communications and an accompanying PR-campaign. This provided consumers with important information on how to reduce product and energy usage and thus also costs whilst maintaining the cleanliness delivered.

The **LSP-L** initiative was opened on July 1, 2009. The “activation” of its implementation took place on July 1, 2010, and the implementation lasted until June 30, 2011. It was deployed in the 27 countries that were members of the European Union (EU) when the initiative was launched plus the four countries of the European Free Trade Association (EFTA): Iceland, Liechtenstein, Norway and Switzerland.

This initiative came within the framework of the Association’s agenda for sustainability and the industry’s commitment to reduce the environmental impact of detergents⁴. The first initiative in this area has been the A.I.S.E. “*Code of Good Environmental Practice*” (which became a European Commission Recommendation - 98/480/EC) and of 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, A.I.S.E. launched in 2006 its first “*Laundry Sustainability Project*” (**LSP-1**), which focussed on HDLS powder detergents for household laundry and although it was open in virtually all European countries, it ended up focussing on the CEE region, where the “*Code*” had never been implemented. In 2008, the members of A.I.S.E. recognized the value of continuing along the same route of **LSP-1** and started the development of two new parallel initiatives: one aimed once more at HDLS household laundry powder detergents (**LSP-2**) and the other addressing for the first time the category of HDLS household laundry liquid detergents (**LSP-L**). In fact

¹ See in annex 1 the *Project Description* document for the “*A.I.S.E. Laundry Sustainability Project for Heavy Duty Low Suds Liquid Detergents*”.

² A so called “Heavy Duty” detergent is one which is meant to wash “normal” laundry as opposed to those detergents for delicate fabrics. According to the already mentioned Annex VIIB of the EU Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents, “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.”

The classification of a detergent in one or in the other category is normally made by the manufacturer and can be clearly identified from the way the legally required “number of standard washes” is calculated. In fact the same annex states:

“The packaging of detergents sold to the general public intended to be used as laundry detergents shall bear the following information:

- *For heavy-duty detergents, the number of standard washing machine loads of ‘normally soiled’ fabrics, and, for detergents for delicate fabrics, the number of standard washing machine loads of lightly-soiled fabrics, that can be washed with the contents of the package using water of medium hardness (...). ”*

³ A liquid detergent is an aqueous or non-aqueous fluid (where molecules can move freely among themselves) or a colloidal solution/dispersion (gel or any other non-solid/gas form) with suspended particles, meant to wash household laundry.

⁴ See www.aise.eu – (*Our activities -> Sustainable Cleaning -> Product Resource Efficiency Projects*).

this product sector was growing and diluted laundry liquid detergents were still the norm on the market.

This report focuses on the achievements of the *LSP-L* initiative in the period from 2008 (base-line reference year) until after its implementation in the market (2012). It presents the sustainability benefits achieved in the total region in terms of reductions of detergent tonnage, packaging materials and transport.

Scope

Products

The *LSP-L* initiative was aimed at all heavy-duty⁵ low suds (HDLS) laundry detergents used for household laundry. The following product executions are, inter alia, included in the scope of this project - as agreed in the project description:

- HDLS liquid detergents sold in traditional containers (e.g. bottles).
- HDLS liquid detergents sold in “mono-doses”.
- HDLS liquid detergents which are sold solely in large containers to be used exclusively by retailers for selling product to consumers in refillable bottles.
- HDLS liquid detergents for the I&I (Industrial & Institutional) sector which are sold in C&C (Cash & Carry) markets and thus are easily available to consumers (even in the case they are sold in large sizes).

Geographical

Geographically, *LSP-L* was deployed in the 27 countries⁶ that were members of the European Union (EU) during the initiative plus the four countries of the European Free Trade Association (EFTA)⁷.

Participating Companies

The *LSP-L* initiative was open to all companies manufacturing or placing on the market regular HDLS liquid detergents for household use in the region. In total 17 companies joined. These companies represented around 75% of the market in the region and are listed in Table 1 below. This included large multinational companies, SMEs and private label manufacturing companies / retailers. Some I&I companies having products similar to the HDLS liquid detergents for household use also joined in.

Table 1. Participating companies

- Crai Secom	- Mc Bride
- Deco Industrie	- Mercadona
- Deterplast	- Persan
- Domal Wittol	- Procter & Gamble
- Farbotex	- Provera France Alimentaire
- Grupo Hermanos Martin	- Reckitt Benckiser
- Henkel	- Système U
- Italsilva	- Unilever
- Madel	

⁵ “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.”

⁶ At that time Croatia was not yet a Member State of the EU.

⁷ The EFTA countries are Iceland, Liechtenstein, Norway and Switzerland.



LSP-L commitments

Recommended dosage

Each company that joined the *LSP-L* initiative had to ensure that all their HDLS household laundry liquid detergents in a given country have recommended dosages which are **not greater than 75ml/wash** for a standard washing machine load⁸ of “normally soiled” fabrics to be washed using water of medium hardness.

Packaging

Participating companies had to continue striving to optimize the usage of packaging materials. As the new formulations entail a reduced volume per wash, companies had to commit to a reduction of packaging materials, remaining at least overall in line with pre-compaction filling levels.

Communication

Importantly, to reach the desired sustainability benefits, not only the manufacturers had to concentrate their products, but also consumers had to adapt their dosing habits to the new dosage instructions. It was therefore key that this message be conveyed in the proper way to consumers.

On-pack

To signal to consumers that the product was concentrated, the pack of the new more concentrated detergents had to bear a distinctive pictogram⁹ (Figure 1).

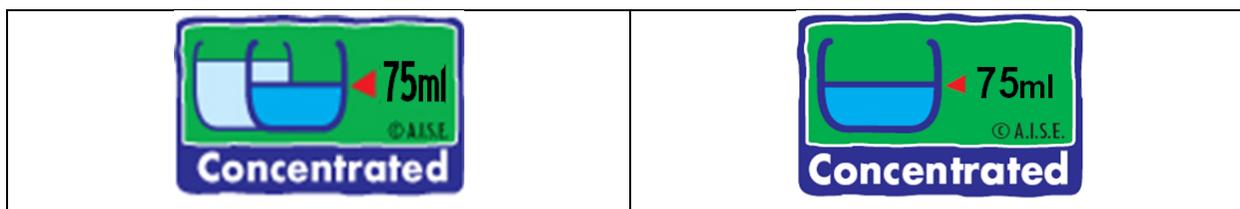


Figure 1. On-pack compaction pictograms

A.I.S.E. made this logo available to all participating companies for use on the labels of their bottles and other promotional material.

Importantly, all the communication material had to take into account the fact that on the market, consumers could find both “regular” (diluted) detergents and also more concentrated variants, which already had recommended dosages which met the *LSP-L* requirements.

In fact, a survey of the European detergent market which was run before the development of *LSP-L*, showed clearly that concentrated HDLS liquid detergents used for household laundry, introduced to consumers at the end of the 80’s, had not universally reached the same levels of market success as their non-concentrated versions in many European countries. The survey confirmed that non-concentrated versions were still present in several markets and were the prevalent form in some important countries.

For those countries where both versions (“diluted” and “concentrated”) existed, often as flankers with the same brand name, A.I.S.E. foresaw the possibility to use both “comparative” and “non-comparative” patches, to ensure maximum transparency for consumers and avoid confusion among the various versions of the same products.

⁸ As defined in Annex VII of the Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents.

⁹ To note that the 75ml indication used in the patch above and in all other instances throughout this report, is just an example as companies had the choice to recommend even lower amounts.

In particular for those products which were being concentrated, companies had to use a “comparative” patch communicating the fact that the product had to be dosed at a lower level than before. An example of such patch is given in Figure 1 (left). On the other hand, for those concentrated products already on the market at the time of the launch of the *LSP-L* initiative, the company had the possibility to communicate that that product was already meeting the dosage limit set by *LSP-L* and required no adjustment in its dosage. An example of such “non-comparative” patch is the one shown in Figure 1 (right)

Those patches have been used for several months on the labels of the products and have served well the purpose of attracting the attention of consumers to the new more concentrated form and the need to look at and adopt the new dosage instructions.

A.I.S.E. campaign

A.I.S.E. and its member National Associations ran centrally and locally at national level a harmonized and intensive communication and educational campaign. This was developed around a newly created “hero”: Mr. Basket (Figure 2).



Figure 2. Mr. Basket

Since that time, Mr. Basket has become also the new A.I.S.E. character to promote among consumers the concept of # of washes as the most appropriate “currency” to differentiate among the various sizes rather than the net weight (for powder detergents) or the volume (for liquid detergents).

A.I.S.E. developed also some specific ad-hoc material to be used with key stakeholders (e.g., the trade, consumer and environmental associations) always with the objective of attracting consumers’ attention to the new more concentrated products and their new dosage instructions.



LSP-L initiative implementation in the market

The analysis of the market data confirms that the *LSP-L* initiative has been very successfully implemented. As per the definition of the product scope in the project description, the volume and value of “Concentrated liquids” covers both traditional concentrated liquid detergents and mono-dose concentrated liquid detergents.

A clear decline of the presence of “standard” HDLS laundry liquid detergents over the *LSP-L* implementation period can be seen in Figure 3, with at the same time an outspoken increase of the concentrated detergents’ volume.

Note that the total liquid detergents volume did not decrease, despite compaction. This is because the overall market share of liquid detergents has steadily increased over time (at the expense of the powder form). Nevertheless, the total volume (green line in Figure 3) shows a notable inflection point around 2010-2011, with a decrease of the volume of HDLS laundry liquid detergents in the region. This coincides with the “activation” of the *LSP-L* project which took place on July 1, 2010.

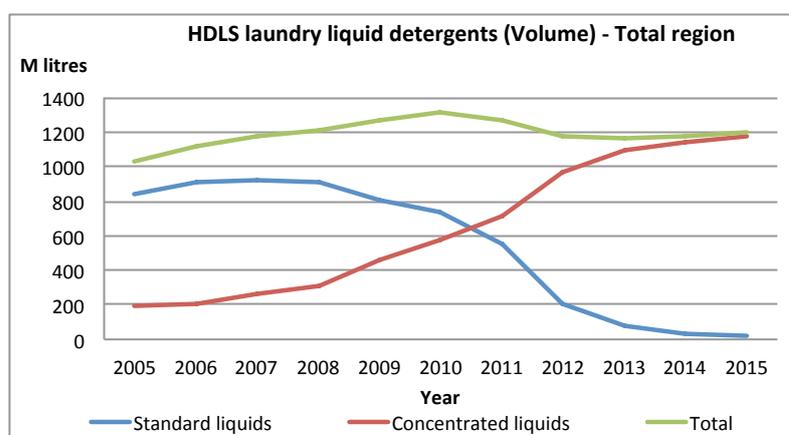


Figure 3. Market shift from standard to concentrated liquid detergents: volume

Also looking at the other indicator that had been selected (conversion to concentrates in terms of “Retail value RSP¹⁰” market shares), the data prove that the 80% objective was significantly exceeded as shown in Figure 4.

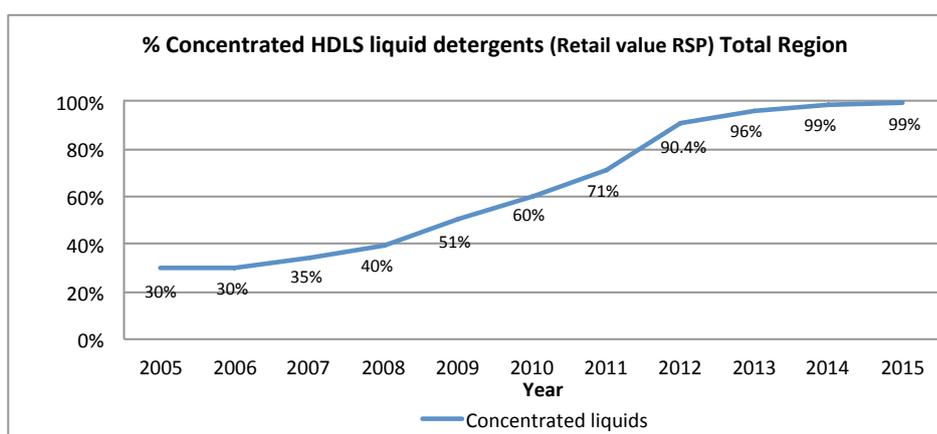


Figure 4. Market shift from standard to concentrated liquid detergents: value share

¹⁰ RSP = Recommended Sale Price

Quantification of detergent tonnage reduction

Expected benefits

After the implementation of the “Code of Good Environmental Practice”, A.I.S.E. started to consider the idea of developing the first LSP initiative, building on the scientific observations provided by the Life Cycle Analysis (LCA) on laundry washing powders that had been conducted at the time¹¹. This study identified the most significant environmental parameters associated with the production and use of laundry powder detergents. The main environmental impact of the laundry process occurs during the use and disposal phases (energy use, water use). Nevertheless, also the production of ingredients is an important aspect. Any reduction in detergent volumes would reduce the impacts of production, transport, packaging and solid waste - and therefore overall environmental impacts. Subsequent LCA studies run in the context of LSP-1 (in Poland and the Czech Republic)¹² and LSP-TR (in Turkey)¹³ confirmed that a move towards more compacted / concentrated products can decrease significantly the impact for all environmental indicators.

Although no full-fledged additional LCA study was run in the context of the LSP-L initiative, before finalizing the project in 2009, A.I.S.E. convened an LCA Expert Working Group in order to evaluate and assess the environmental positive potential of this new initiative. This group developed a preliminary evaluation based on the hypothesis of concentrating the at the time “dilute” liquid detergents to a level that would allow obtaining an equivalent performance with a maximum dosage of 75 ml. This hypothesis was fully in line with the minimum commitments that a company participating to LSP-L would have to fulfil.

To generate a figure for the expected potential reductions in the environmental load, the LCA Working Group together with LSP-L project team estimated the HDLS laundry liquid detergents’ market in the whole region covered in the scope of this project.

In line with the indications of the “Project description”, this estimate took into account both the HDLS liquid detergents sold in traditional containers (e.g., bottles, pouches) and also those HDLS liquid detergents sold solely in large containers to be used exclusively by retailers for selling product to consumers in refillable bottles. Also the HDLS liquid detergents sold as “mono-doses” such as “Liquid tablet” detergents also called “Liquitabs” or “Washing capsules” were included. These products have typically very low dosages (ca 25 to 30 ml) and have therefore been included in the concentrated segment. This estimate was included in the “Project description” document and is presented in Table 2.

Table 2. HDLS liquid detergent market size (initial estimate - project description)

Total Region ¹⁴ HDLS liquid detergents’ market (2008)	1500 million litres = 1.50 million tonnes
Total Region “traditional” HDLS liquid detergents’ market (ca 73% of total) (2008)	1100 million litres = 1.10 million tonnes

On this basis, various theoretical calculations showed that the planned initiative had the potential to reduce on a yearly basis the environmental load related to ingredients by a maximum of circa 400000 tonnes (equivalent to 400 million litres).

¹¹ “A.I.S.E. Code of Good Environmental Practice: Final Report to the European Commission 1996-2001” (IBM Global Services - 2002)

¹² Re. the “Comparative Life Cycle assessment of compacted with non-compacted heavy duty low suds detergent formulations in Poland and the Czech Republic” study prepared by Procter & Gamble, Brussels Innovation Center, Central Product Safety – Environmental (Joost Dewaele, Rana Pant) and critically reviewed by Ecobilan – PricewaterhouseCoopers (Philippe Osset) and Gingko 21 (Hélène Teulon)
This study is available upon request at A.I.S.E.

¹³ Re the “Comparative Life Cycle Assessment of compacted with non-compacted heavy duty powder detergent formulations in Turkey” – Study prepared by Procter & Gamble Brussels Innovation Center Central Product Safety – Environmental (Gert Van Hoof, Joost Dewaele) – August 2008

This study is available upon request at A.I.S.E.

¹⁴ The “Region” is defined as the EU 27 + the four countries of the European Free Trade Association (EFTA): Iceland, Liechtenstein, Norway and Switzerland (To note that at that time Croatia was not yet a Member State of the EU).

These expected environmental load reductions were judged sufficiently probable to be achieved and also of sufficient importance to justify an industry led initiative under the auspices of A.I.S.E. So the project was agreed and implemented.

As a measure of the success of the project, the project team also set a target to reach a conversion rate higher than 80% in “Retail value RSP” market shares.

To note that the above indicated size of the total market proved later to have been overestimated. In fact a more accurate estimate, based on the reports from *Euromonitor International*, would have been the one shown in Table 3.

Table 3. HDLS liquid detergent market size (Euromonitor data)

Total Region HDLS liquid detergents' market (2008)	1212 million litres = 1.21 million tonnes
Total Region “traditional” HDLS liquid detergents' market (ca 75% of total) (2008)	904 million litres = 904000 tonnes

To note that the source of virtually all the data used throughout this report to calculate the benefits delivered by this initiative have been provided by *Euromonitor International*, whom A.I.S.E. thanks for their support. Importantly this approach has avoided the risk of sharing confidential information across the participating companies.

On the basis of these revised estimates and applying the same theoretical calculations as before, the maximum potential to reduce on a yearly basis the environmental load related to ingredients, would be ca 330000 tonnes (equivalent to 330 million litres). Although this number is smaller than the original one, it is still of a magnitude sufficient to justify the project.

In the course of the original market analysis, the *LSP-L* project team identified also large differences in how the HDLS laundry liquid detergents market had evolved in the various countries of the region.

In particular France, Italy and Spain were identified as the “target countries” with the highest potential for delivering significant benefits in terms of reduction of the environmental load. In fact in those countries the HDLS laundry liquid detergents markets were already large and they had the highest volume of traditional HDLS liquid detergents since standard liquids were still the norm in the market. In fact in 2008 this segment represented ca 90% of their total market.

For this reason, significant effort in terms of communication was invested in these countries by the respective National Associations in order to move the market and consumers towards concentrated products. These efforts have paid out and have pushed the overall success of the initiative.



Methodology

Market data

All market data were obtained from Euromonitor International. These data are available on a year by year basis from 2001 until 2015. They include European as well as country-specific sales volumes of liquid and powder detergents. Within liquids, a differentiation is made between dilute products and concentrated products (concentrated traditional liquids and mono-dose capsules). Sales volumes are available on the one hand expressed in retail value (million EUR per year - recommended sale price RSP), and on the other hand also in million litres per year (for liquid detergents).

Market dynamics

In parallel with the deployment of the LSP-L project (2009-2011), the European detergents market has seen a fundamental and steady decline of the laundry powders segment, and an equivalent increase of the liquids segment. This is shown in Figure 5 (expressed as retail value).

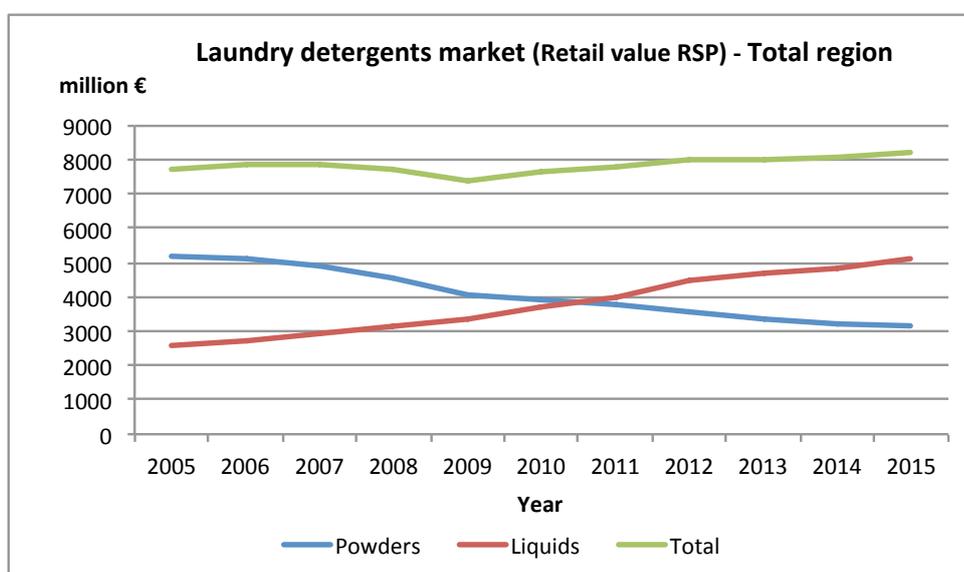


Figure 5. European detergents market - retail value

This market shift from powders to liquids has continued beyond the LSP-L project duration, and has shown a linear behaviour between 2001 and 2015, as can be seen in Figure 6. The linear regression has a high correlation $r^2 = 0.973$.

Benchmark

Calculating the detergent tonnage reduction achieved through the LSP-L initiative is not a straight forward exercise. As shown above, over time, the liquid detergents market has steadily grown, as a consequence of the fact that consumers were moving away from powders and preferred the liquid form. In parallel, because of the “elimination” of the standard diluted liquid detergents, this growth has been more limited in terms of tonnage.

The liquid detergent volume reduction thanks to the LSP-L initiative can be estimated by comparing the actual volume after completion of the initiative with a hypothetical benchmark volume that could have been expected should compaction not have taken place.

Based on the market value trend (Figure 6) one can conclude that the use of liquid detergents has steadily and linearly increased year after year, until and beyond the completion of the LSP-L initiative. Between 2001 and 2009 (i.e. before the implementation of the LSP-L compaction), the liquid detergent volume had followed a very similar, also clearly linear trend ($r^2 = 0.993$) (Figure 7). Building on these observations, one can reasonably assume that, should compaction not have taken place, this linear increase would most likely have continued - in the same way as the market value trend.



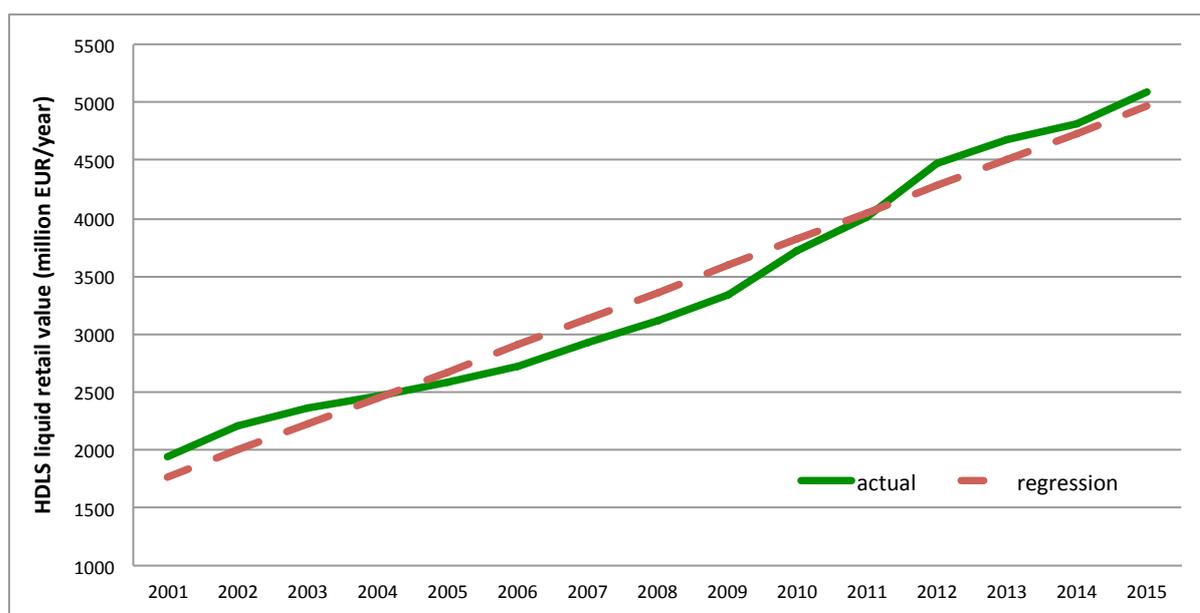


Figure 6. HDLS liquid detergent retail value - linearity of the trend

Consequently, the hypothetical no-compaction benchmark is calculated by linear regression, extrapolating the trend observed in the period prior to *LSP-L* (typically the period 2001-2009, but may be adapted for specific individual country assessments) to the period following the *LSP-L* deployment. The year 2012, immediately following the implementation in the market of *LSP-L* is the assessment's end point. This approach is shown for the entire region in *Figure 7*. For 2012, the extrapolated "no-compaction" liquid detergent volume is 1487 million litres; whereas the actual volume (with compaction in place) was 1177 million litres.

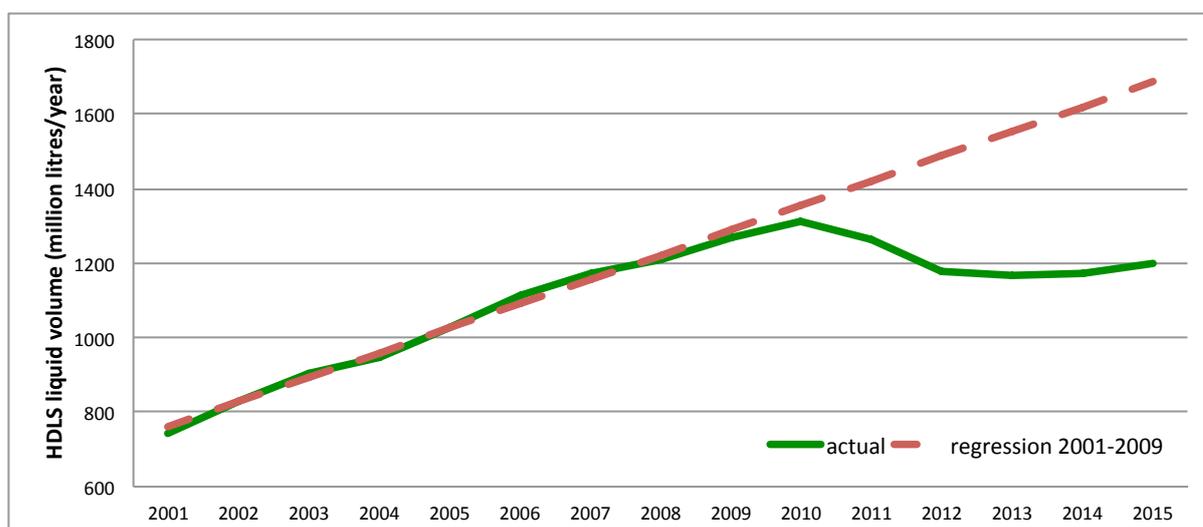


Figure 7. European detergents market - liquids volume - actual and extrapolated

Estimation of tonnage reduction

The liquid detergent tonnage reduction achieved through the *LSP-L* initiative is calculated as the difference between the extrapolated hypothetical no-compaction benchmark tonnage (based on extension of the pre-compaction trend) for the year 2012, and the actual market tonnage after the implementation of compaction in 2012.

Recall that about 75% of the market is covered by the companies who signed up to the *LSP-L* initiative. However, by 2012, over 90% of the liquids market had moved to the compact form (Figure 5). Later on (by 2015) this was even 99%. This means that most of the companies who had not signed up to the voluntary initiative, had in practice followed suit, and had implemented compaction

independently. Strictly speaking, the tonnage reduction achieved by non-signatory companies is not a direct result of *LSP-L*. However, it is fair to assume that these companies followed the general trend in the market, which was driven by *LSP-L*. Hence, de facto, it is appropriate to include these tonnage reductions as an (albeit indirect) achievement of the *LSP-L* initiative.

Estimation of packaging reduction

A reduction in packaging materials is achieved, thanks to either the use of smaller bottles, or the containment of more detergent loads in the same bottle size.

Based on feedback from several companies, the 3 L bottle size is representative of the situation before the *LSP-L* compaction. The packaging weight for a 3 L bottle is on average about 250 g, of which 140-150 g for the bottle, cap and label, and 110 g for the secondary (transport) packaging. Consequently, for each tonne of detergent volume reduced, a packaging reduction by 83 kg was assumed.

It should be noted that the above assumption is only directly applicable for dilute traditional liquids being replaced by concentrated traditional liquids. It may not be accurate for liquid compaction via the mono-dose format, where different packaging forms (mainly tubs, but also stand-up pouches) are used. However, the impact on the overall packaging reduction estimation is expected to be limited. In 2012, the year after the implementation of *LSP-L*, based on Euromonitor data, mono-dose liquids represented 6.4% of the liquid detergent volume. In 2009, just before *LSP-L*, this was 2.9%. Hence, the incremental volume for mono-dose liquids during the implementation of *LSP-L* was 3.5% of the liquids segment. During this same time, the incremental volume for traditional concentrated liquids (from 33.3% to 75.9%) was 42.6% of the liquids segment. This is over an order of magnitude higher than the mono-dose volume growth. Consequently, any inaccuracies due to applying the packaging reduction estimated from bottles, will not be meaningful when considered across the liquids segment.

Estimation of greenhouse gas reduction

Most of the greenhouse gas emissions in the life cycle of laundry detergents are associated with energy to heat the water during the use phase. This aspect is not impacted by compaction. Next come the greenhouse gas emissions associated with the sourcing of the detergent ingredients. The main impact of compaction for liquid detergents at this life cycle stage, is that substantially less water is used as ingredient. However, greenhouse gas emissions due to the use of water are very small compared to other detergent ingredients. Finally, energy (and greenhouse gas) savings are achieved in the processing, packaging and transport of the detergent, because of the lower volumetric throughput for the same number of wash loads. While still relevant, these processes do not represent a major contribution in the overall life cycle.

Based on several LCA studies (public as well as proprietary) one may assume that per tonne of detergent volume reduction, by moving from dilute to compact liquid detergents, in the order of 0.2 tonnes of CO₂eq is saved¹⁵. This is a meaningful benefit, but nevertheless, it is an order magnitude less than the greenhouse gas savings achieved by powder detergent compaction.

The climate benefit can be compared to the emission of a passenger car. An average new car in the EU (2016 status) has a carbon emission of 118.1 gCO₂eq/km (ACEA¹⁶). As such, one tonne of liquid detergent reduction corresponds with avoiding 1693 car kilometers.

¹⁵ Gert Vanhoof, Procter & Gamble, personal communication (May 2017).

¹⁶ <http://www.acea.be/statistics/tag/category/co2-emissions-trends> accessed 23/10/2017

Estimation of transport reduction

Liquid laundry detergents consist of chemical ingredients and water. The chemical ingredients are typically transported by truck to the detergent manufacturing plants, over a distance of typically 2000 km (cf. the LCA study on powder detergents by PRé Consultants, 2014)¹⁷. The water is sourced locally at the manufacturing plant and does not require truck transport. Transport of the finished product to the retailers is by truck, on average over a distance of 1200 km (cf. LCA study mentioned above). This also includes the water.

For the purpose of this estimation, a number of assumptions are made. For standard liquid detergents (i.e. prior to compaction) it is assumed that the water content is typically 70%, while for concentrated liquid detergents this is assumed to be 50%.

- This assumption implies an equivalent amount per dose of chemical ingredients, hence, no transport reduction at the level of shipping ingredients to the manufacturing plant. Note that this is a conservative assumption, because in reality, compaction had formula design impacts beyond simply the reduction of the water content.
- On the other hand, a substantial transport reduction is achieved during the shipment of finished product to the retailers. Table 4 shows that for every tonne of detergent reduction, an estimated transport reduction of 1200 tonne.km can be assumed.

Table 4. Estimation of tonnage reduction

	Standard liquid detergent	Concentrated liquid detergent	Reduction
Dosage	125 ml/wash	75 ml/wash	50 ml/wash
Tonnage	2.5 tonnes	1.5 tonnes	1 tonne
Ingredient transport (2000 km)	1500 tonne.km	1500 tonne.km	-
Finished product transport (1200 km)	3000 tonne.km	1800 tonne.km	1200 tonne.km

The transport reduction that goes with every tonne of detergent volume reduction, i.e. 1200 tonne.km, is equivalent to 54 km driven by a heavy truck with a typical load¹⁸ of 22 tonnes.

¹⁷ 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.

¹⁸ 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 achievements across the total region

In short, the achievements generated by this initiative are very substantial and one can say that *LSP-L* has de facto shifted the whole HDLS laundry liquid detergents market towards the more concentrated products, eliminating the very diluted ones.

Tonnage reduction

Extrapolating the trends between 2001 and 2009 and comparing the projected growth of the HDLS laundry liquid detergents market in the region versus the actual figures, one can come up with a reasonably accurate estimate of the benefits in terms of environmental load reduction derived from the implementation of the *LSP-L* initiative, as shown in Figure 8.

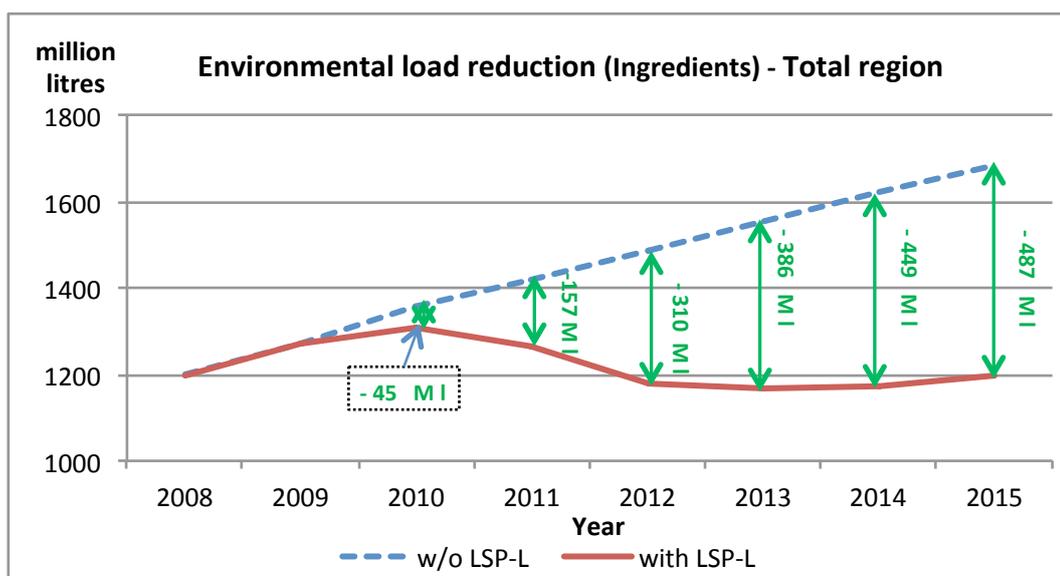


Figure 8. Liquid detergent volume reduction (million litres) thanks to compaction

These data present a very positive picture and confirm that the *LSP-L* initiative delivered environmental benefits well beyond expectations. For the year 2012, immediately after the conclusion of the project, an annual reduction of 310000 tonnes is estimated.

It should be noted that in the subsequent years, as a consequence of the ongoing growth of the liquids segment, the tonnage reduction was further increased, reaching 487000 tonnes/year in 2015. The cumulative savings across the period from 2010 until 2015 are estimated at 1834000 tonnes in total.

Important to note, 95% of these benefits were obtained in four countries where the markets had the largest potential and consumers responded the best. Those countries were France, Italy, the Netherlands, and Spain (Table 5).

Table 5. Estimated liquid detergent tonnage reduction in the 4 key countries

	reduction in 2012 versus before compaction (tonnes/year)	Country percentage relative to total region
France	76000	25%
Italy	100000	32%
Netherlands	55000	18%
Spain	65000	21%
Total region	310000	



In some countries of the region (e.g. Germany and the UK) concentrated HDLS liquid detergents had already been introduced as the most important form in the liquids segment well before the deployment of the *LSP-L* initiative. In other countries, mainly in the CEE region, the liquid segment took off relatively late and in these markets only concentrated products were introduced right from the beginning. Hence, *LSP-L* offered very limited opportunity for further reductions.

In general it can be concluded that the implementation of *LSP-L* has successfully delivered the initially estimated tonnage reduction of 400000 tonnes per year, that was made at the time of the project initiation. This target was already achieved for over three-quarters in the year 2012 following the closure of *LSP-L*, and it was exceeded as of 2014.

Packaging reduction

In addition to the benefits related to the reduction of detergent tonnages, additional benefits can be estimated in terms of reduction of packaging materials.

In 2012, the estimated annual reduction in the environmental load for packaging materials exceeded 25000 tonnes.

Greenhouse gas reduction

The greenhouse gas reduction attributed to liquid detergent compaction, by 2012, is estimated to be 62000 tonnes of CO₂eq per year.

This is equivalent to avoiding 525 million car kilometers every year.

Transport reduction

Finally, these reductions in ingredients and packaging materials have led to a significant decrease in terms of trucks journeys. Just considering the journeys needed to deliver the finished product (i.e. assuming no difference related to the delivery of raw materials), one can calculate a reduction of 372 million tonne.km in the year 2012, which corresponds to 17 million km driven by a heavy truck - 425 times around the world.



Estimated achievements per country / cluster

Countries are listed in alphabetical order.

Austria

The *LSP-L* initiative had a very limited impact in this country, because the large majority of Austrian consumers had already moved to concentrated HDLS laundry liquid detergents well before the implementation of *LSP-L*. In fact already in 2005 concentrated liquid detergents represented 95% of the “Retail value RSP” market (93% in volume). In 2010 these figures were respectively 96% and 95% and both grew up to more than 99% in 2015.

Baltic countries (Estonia, Latvia, Lithuania)

In the Baltic countries, laundry powder detergents continued to represent the majority of the market. In fact the HDLS laundry liquid detergents’ market started to grow only after year 2000, with Lithuania being the largest market of the three. By 2005 it still represented only 10% of the total “Retail value RSP” market, slowly growing, and reaching 33% in 2015 (see Figure 9 for the absolute values).

Initially standard liquid detergents had the lion’s share, but the implementation of the *LSP-L* initiative quickly pushed up concentrated liquid detergents which became the most important liquids segment (Figure 10). Nevertheless, the absolute contribution in these countries to the total environmental load reduction across the region has been quite limited as the size of their market is relatively small.

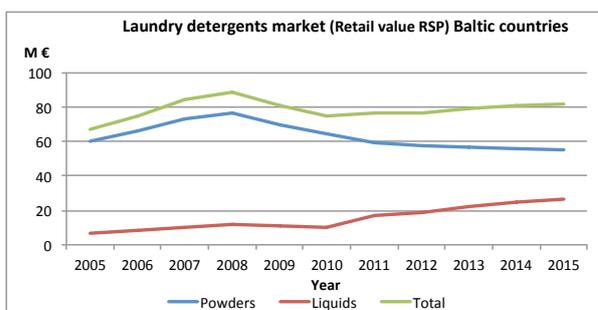


Figure 9. Baltic countries - laundry detergents market (value in million EUR)

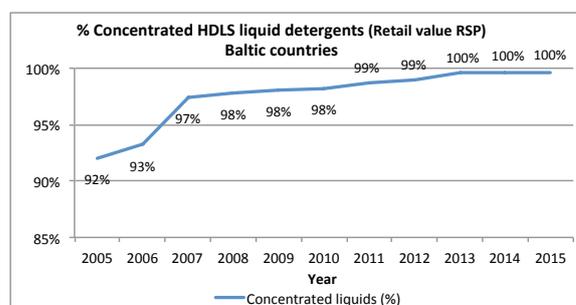


Figure 10. Baltic countries - concentrated liquid detergents value share of liquid segment

Belgium / Luxembourg

In these two countries, the large majority of consumers had already moved to concentrated HDLS laundry liquid detergents before the implementation of the *LSP-L* initiative. In fact already in 2005 concentrated detergents represented 97% of the “Retail value RSP” market (95% in volume). In 2010 these figures were respectively 99% and 98% and both grew up to 100% in 2015. Hence the *LSP-L* initiative in these countries had virtually no impact.

Bulgaria

The data for Bulgaria are included in a cluster with Romania.

Cyprus

The data for Cyprus are included in a cluster with Greece and Malta.

Czech Republic / Slovakia

The market evolution in these two countries is similar to the other CEE countries, though it is ahead by a few years. Powder detergents have been historically the most important segment, but eventually liquids started to grow and they overtook powders in 2015 (Figure 11).



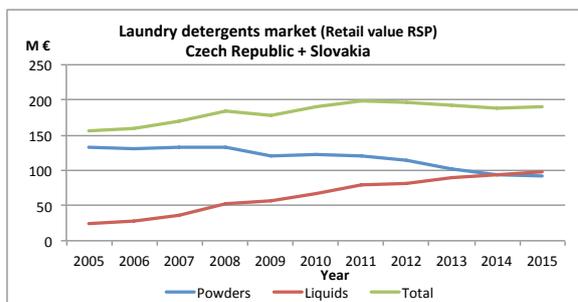


Figure 11. Czech Republic and Slovakia - laundry detergents market (value in million EUR)

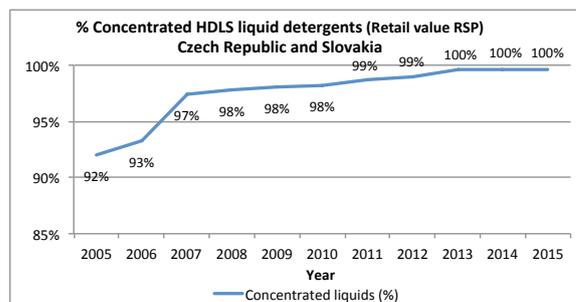


Figure 12. Czech Republic and Slovakia - concentrated liquid detergents value share of liquid segment

Concentrated detergents took the lead right from the earlier years of liquids introduction. In 2001 concentrates represented 69% of the liquid market, in 2005 they were already at 91% and they reached 100% from 2008 onwards (Figure 12). Therefore in these markets, the LSP-L initiative did not generate any environmental load reduction.

France

France, together with Italy and Spain, had been identified right from the beginning of the project as one of the key countries with the highest potential for delivering significant benefits in terms of environmental load reductions. For this reason a particular effort was dedicated by the local National Association (Afise¹⁹) to promote maximum support from the industry and this led to the direct participation of 7 companies in this country.

Liquids have been the largest detergent form in France since 2005, and have continued to grow (Figure 13). Figure 14 shows very clearly how the implementation of the LSP-L initiative rapidly transformed the HDLS liquid detergents market between 2011 and 2012 from being dominated by standard products into a market with only concentrated products. As a consequence of this evolution in the market, the total environmental load reduction in France is very significant and represents 25% of the total obtained in the whole region.

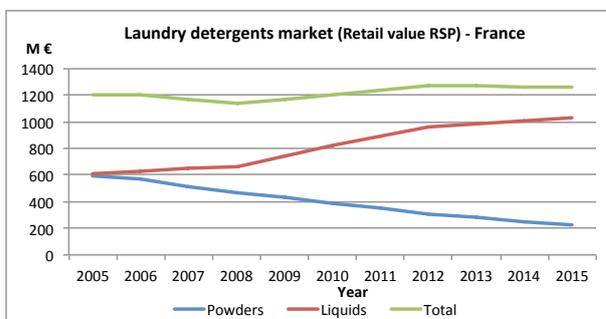


Figure 13. France - laundry detergents market (value in million EUR)

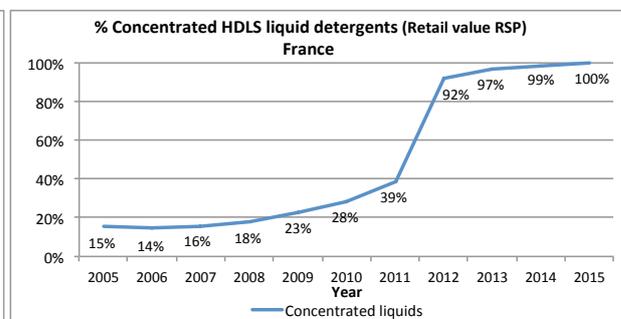


Figure 14. France - concentrated liquid detergents value share of liquid segment

For 2012, the liquid detergent tonnage reduction is estimated at 76000 tonnes/year (Figure 15). There was a packaging reduction by 6300 tonnes per year, and a transport avoidance of 3.7 million tonne.km.

¹⁹ Afise : Association française des industries de la détergence, de l'entretien et des produits d'hygiène industrielle.
(See more at: <http://www.afise.fr/>)

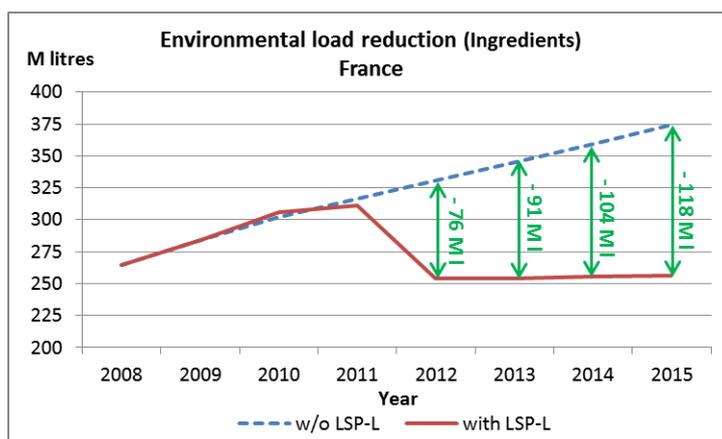


Figure 15. France - Liquid detergent volume reduction (million litres) thanks to compaction

Germany

By 2010, when the LSP-L initiative was activated, the HDLS laundry liquid detergents market had already moved almost completely towards concentrated liquids (Figure 17). Therefore, in spite of the significant size of the liquid detergents market in Germany (larger than powders since 2011, Figure 16), the impact of the LSP-L initiative in this country has been quite small.

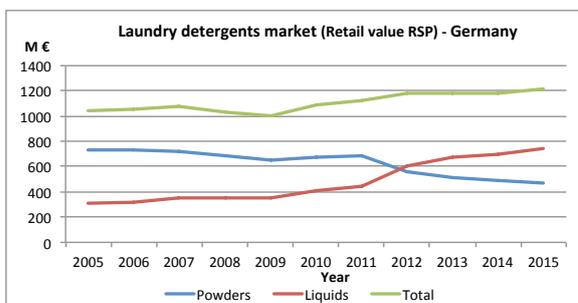


Figure 16. Germany - laundry detergents market (value in million EUR)

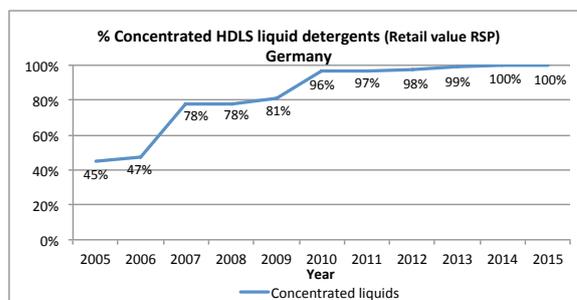


Figure 17. Germany - concentrated liquid detergents value share of liquid segment

Greece / Cyprus / Malta

The HDLS liquid segment size in the cluster formed by Greece, Cyprus and Malta had approached that of powders during the LSP-L implementation period, but only exceeded powders by 2015 (Figure 18). The laundry liquid detergents market size is relatively small. Although in absolute terms this has limited the impact of the LSP-L initiative, looking at Figure 19 one can appreciate the value of the LSP-L initiative which transformed the HDLS liquid detergents market in Greece and Cyprus between 2010 and 2012 from mainly standard products to only concentrated products. In Malta, on the other hand, concentrated liquid detergents had started right from the beginning as the sole type of liquid products.

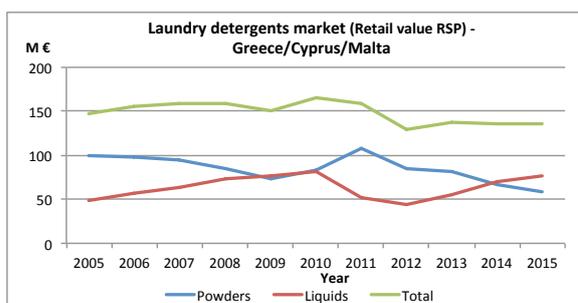


Figure 18. Greece/Cyprus/Malta - laundry detergents market (value in million EUR)

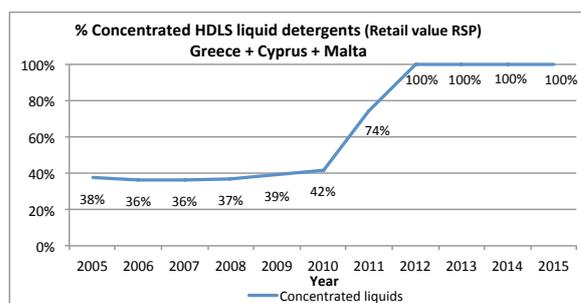


Figure 19. Greece/Cyprus/Malta - concentrated liquid detergents value share of liquid segment



Hungary

The Hungarian HDLS laundry detergent “Retail value RSP” market is somewhat unique within the region. In the period between 2005 and 2015, powders have been decreasing significantly, but liquids have remained more or less stable (Figure 20). Within the liquid detergents market, concentrated detergents represented the majority of the market already well before the implementation of the LSP-L initiative and they continued to grow up to 96% in “Retail value RSP” terms in 2015 (Figure 21). Consequently, one can conclude that also in Hungary the LSP-L initiative had a very limited if any impact.

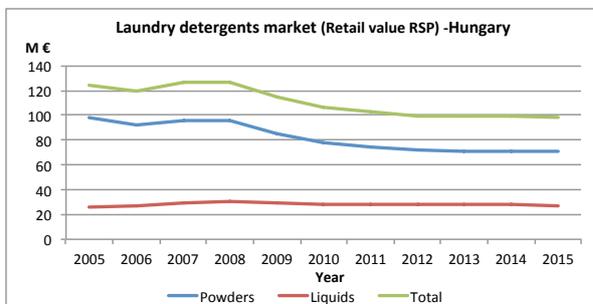


Figure 20. Hungary - laundry detergents market (value in million EUR)

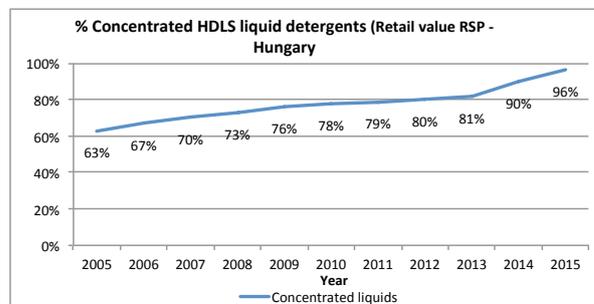


Figure 21. Hungary - concentrated liquid detergents value share of liquid segment

Ireland

The data for Ireland are included in a cluster with the UK.

Italy

Italy, together with France and Spain, had been identified right from the beginning of the project as one of the key countries with the highest potential for delivering significant benefits in terms of environmental load reductions.

For this reason a particular effort was dedicated by the local National Association (Assocasa²⁰) to promote maximum support from the industry and this led to the direct participation of 10 companies in this country.

The liquids segment in Italy had surpassed the powders segment well before the LSP-L initiative, with liquids representing about twice the powders value by 2012 (Figure 22). Figure 23 shows clearly how the implementation of the LSP-L initiative transformed the HDLS liquid detergents market between 2010 and 2013 from being dominated by standard products into a market with only concentrated products.

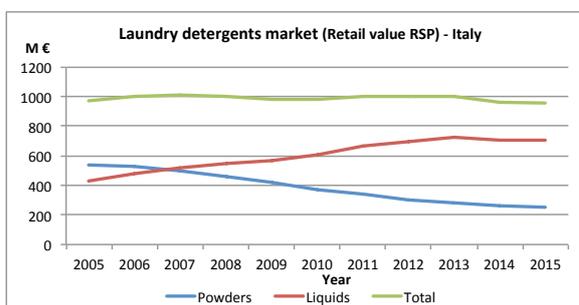


Figure 22. Italy - laundry detergents market (value in million EUR)

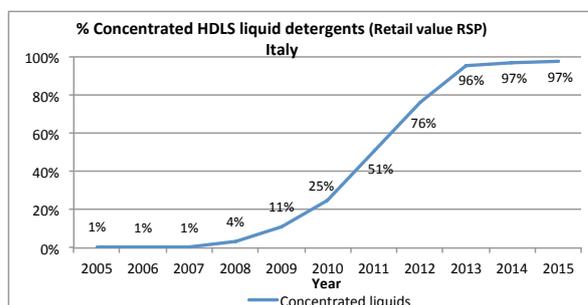


Figure 23. Italy - concentrated liquid detergents value share of liquid segment

²⁰ Assocasa : Associazione Nazionale detergenti e specialità per l'industria e per la casa.

(See more at: <http://assocasa.federchimica.it/>)

The total environmental load reduction was very significant and represented more than 30% of the total obtained in the whole region. For 2012, this reduction is estimated to be 100000 tonnes/year (Figure 24), 8300 tonnes/year of packaging, and 120 million tonne.km of truck transport.

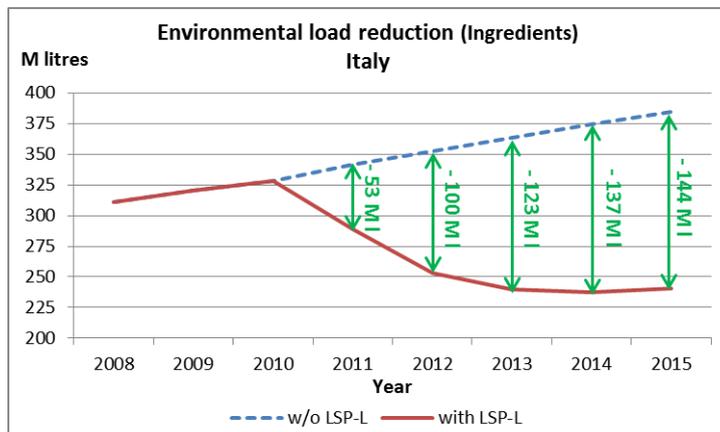


Figure 24. Italy - Liquid detergent volume reduction (million litres) thanks to compaction

Liechtenstein

The data for Liechtenstein are included in a cluster with Switzerland.

Luxembourg

The data for Luxembourg are included in a cluster with Belgium.

Malta

The data for Malta are included in a cluster with Greece and Cyprus.

Netherlands

The Netherlands has been one of the major contributors to the success of the LSP-L initiative. This speaks in favour of the effort invested by the local industry association N.V.Z.²¹

HDLS laundry liquid detergents had grown significantly at a rapid pace reaching almost 70% of the total "Retail value RSP" market in 2010, and 80% by 2015 (Figure 25). Up to 2010, the large majority of this market was covered by standard liquids. Figure 26 illustrates how the implementation of the LSP-L initiative transformed this between 2010 and 2013 to a market with only concentrated products.

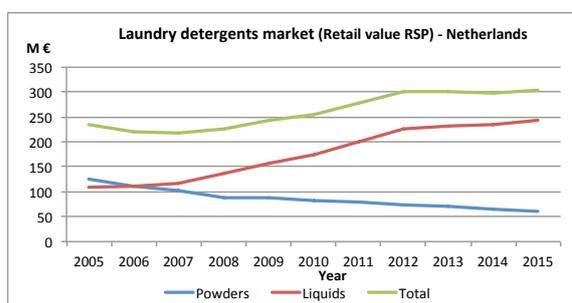


Figure 25. Netherlands - laundry detergents market (value in million EUR)

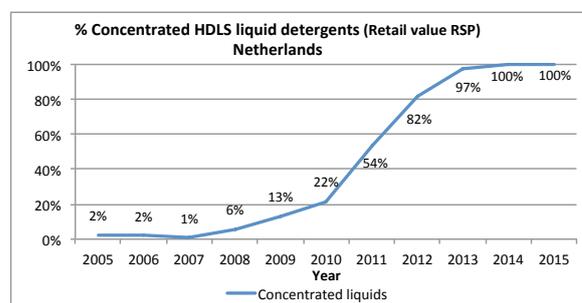


Figure 26. Netherlands - concentrated liquid detergents value share of liquid segment

²¹ N.V.Z. : Nederlandse Vereniging van Zeepfabrikanten
(See more at: <http://www.nvz.nl>)

The total environmental load reduction was very significant and represented almost 20% of the total obtained in the whole region, not much below the contribution of the key countries (France, Italy and Spain) despite a much smaller absolute detergents market size.

For 2012 the estimated liquid detergent tonnage reduction is 55000 tonnes/year. The packaging reduction is estimated at 4500 tonnes/year, and the transport avoidance at 66 million tonne.km.

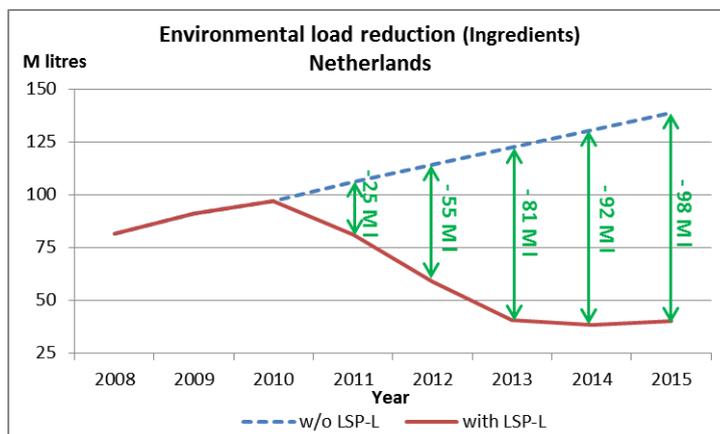


Figure 27. Netherlands - Liquid detergent volume reduction (million litres) thanks to compaction

Nordic countries (Denmark, Iceland, Norway, Sweden)

The HDLS laundry detergents markets in the Nordic countries are still very much skewed towards powders. The liquids values share ("Retail value RSP") ranges from 24% on Sweden to 44% in Denmark. Furthermore virtually only concentrated HDLS liquid detergents have been on the market since the appearance of liquids. Hence the *LSP-L* initiative in these countries had no impact.

Poland

In Poland, the development of the HDLS liquid detergents market has been very slow. In 2015 liquids accounted for only 12% of the detergents "Retail value RSP" market (Figure 28).

With regard to the move from standard to concentrated liquids, Figure 29 shows that, even if there has not been a step change during the implementation of the *LSP-L* initiative, concentrated liquids have grown steadily, reaching over 90% of the segment share by 2015.

In absolute terms however the *LSP-L* initiative in Poland had virtually no impact as a consequence of the small size of the HDLS liquid detergents market.

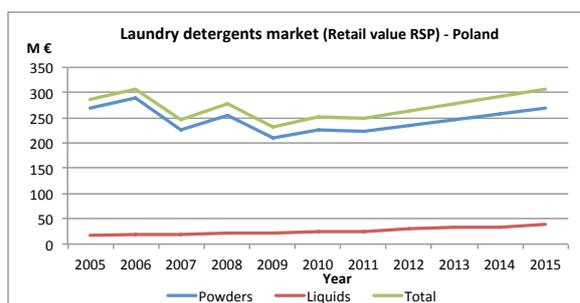


Figure 28. Poland - laundry detergents market (value in million EUR)

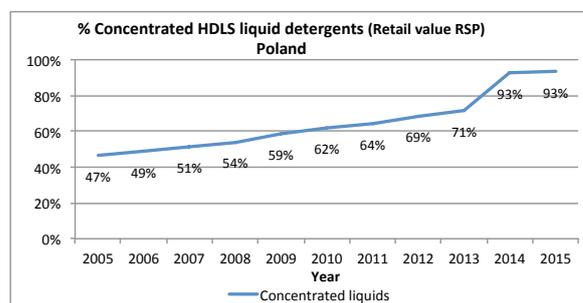


Figure 29. Poland - concentrated liquid detergents value share of liquid segment

Portugal

Liquids took over as the leading detergent form in Portugal from the powders segment around the time of the *LSP-L* initiative (Figure 30), with the liquids segment almost 50% larger than powders by 2012. Immediately after the *LSP-L* initiative, in 2012, the liquid laundry detergents market in Portugal was still for two-thirds in the dilute form (Figure 31). This rapidly changed in the subsequent years, reaching a nearly complete share for the compact form by 2014. Nevertheless, because of this time delay, only limited tonnage reductions can be directly attributed to *LSP-L* in 2012. Furthermore,

contrary to the overall European situation or to the situation in other key countries, linear regression was not a good descriptor of the increasing liquids volume in the market between 2001 and 2009. As such, no tonnage reduction could be calculated relative to the extrapolated “no-compaction” benchmark.

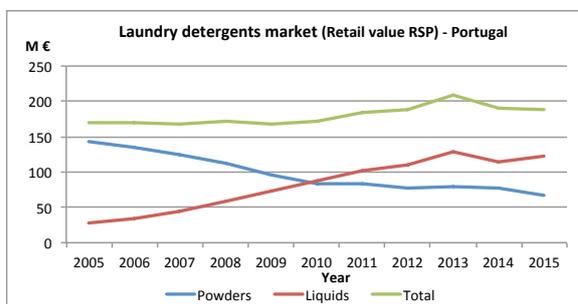


Figure 30. Portugal - laundry detergents market (value in million EUR)

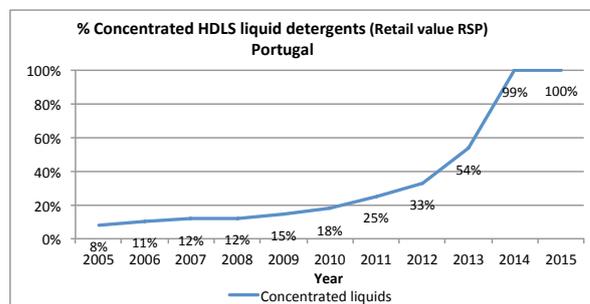


Figure 31. Portugal - concentrated liquid detergents value share of liquid segment

Romania / Bulgaria

The laundry detergents market evolution in these two countries has been similar to the one in the Baltic countries with regard to the predominance of powders versus liquids. In particular liquids started to have a somewhat significant presence in the market only after 2007 and the market moved directly towards concentrated liquids which since 2010 represent the quasi totality (> 98%) of the market. Hence the *LSP-L* initiative in these countries had virtually no impact.

Slovakia

The data for Slovakia are included in a cluster with the Czech Republic.

Slovenia

No actual market data were available for Slovenia, hence, the impact of *LSP-L* could not be quantified for this country.



Spain

Over the past 10 years, Spain has moved from predominantly a powders market to a liquids market (Figure 32). The conversion from standard liquids to concentrated liquids (Figure 33) started already in 2009, a year earlier than the start of the *LSP-L* initiative, and covered essentially the entire liquids market by 2012. It is a fair assumption that, despite the slightly different timing, this conversion nevertheless happened as a direct consequence *LSP-L*, thanks to the proactive promotion of this initiative by the local national industry association ADELMA²². As a result of these efforts, in Spain 7 companies formally joined the project.

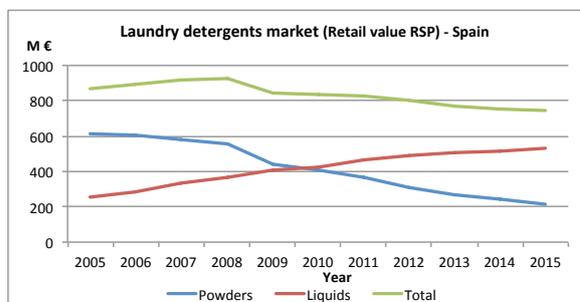


Figure 32. Spain - laundry detergents market (value in million EUR)

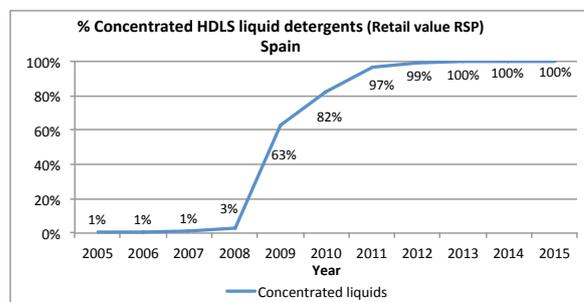


Figure 33. Spain - concentrated liquid detergents value share of liquid segment

To calculate the total environmental load reduction related to the implementation of the *LSP-L* initiative, for Spain, it was assumed that the move towards concentrated products had been triggered in 2009 by the already announced upcoming *LSP-L* initiative. As such, for the benchmarking, the liquid detergent volume trend was extrapolated based on the period from 2001 to 2008 (before compaction), instead of 2009 (when compaction had already been initiated) (Figure 34).

For 2012 the estimated liquid detergent tonnage reduction is 65000 tonnes/year. The packaging reduction is estimated at 5400 tonnes/year, and the transport avoidance at 78 million tonne.km.

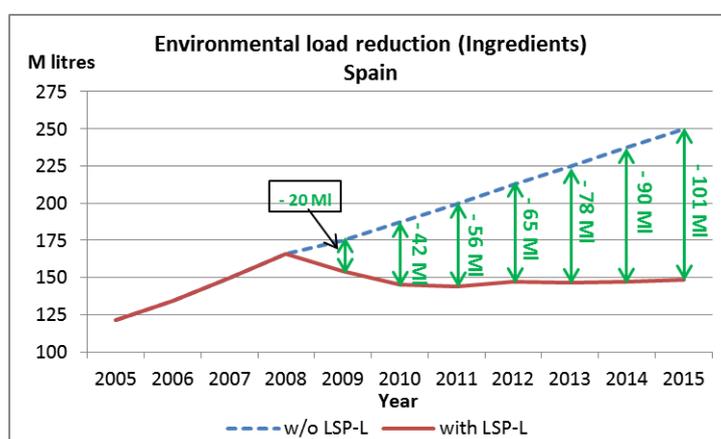


Figure 34. Spain - Liquid detergent volume reduction (million litres) thanks to compaction

Switzerland / Liechtenstein

In these two countries, the large majority of consumers had already moved to concentrated HDLS laundry liquid detergents before the implementation of the *LSP-L* initiative. In fact already in 2005 concentrated detergents represented 99% of the “Retail value RSP” market and 99% in volume. Both figures moved to 100% in 2007 and remained unchanged until 2015. Hence the *LSP-L* initiative in these countries had virtually no impact.

²² ADELMA : Asociación de Empresas de Detergentes y de Productos de Limpieza, Mantenimiento y Afines

(See more at: <http://www.adelma.es>)

UK / Ireland

By 2010, when the *LSP-L* initiative was activated, concentrated liquids accounted already for 90% of the HDLS laundry liquid detergents market in these two countries (Figure 36). Therefore, in spite of the significant size of the detergents market, and of the liquid segment, in the UK + Ireland (Figure 35), the impact of the *LSP-L* initiative in these countries has been very small.

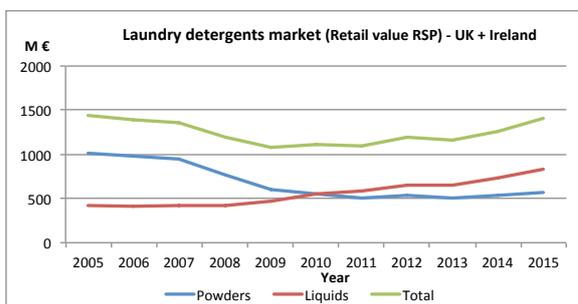


Figure 35. UK + Ireland - laundry detergents market (value in million EUR)

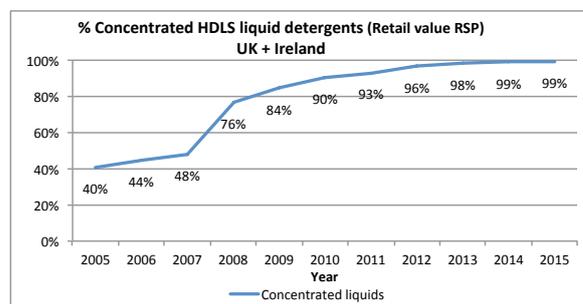


Figure 36. UK + Ireland - concentrated liquid detergents value share of liquid segment



Conclusions

The *LSP-L* initiative can be considered as yet another very positive move forward in terms of sustainability. If such an industry-wide initiative had not taken place, product consumption would have been substantially higher, and one can say that it has de facto shifted the whole HDLS laundry liquid detergents market towards the more concentrated products, phasing out the diluted ones.

As consumers have been moving more and more away from laundry powder detergents, showing a clear preference for liquids instead, it has been even more relevant to help shift the market towards concentrated products. At the end of the lifetime of the *LSP-L* initiative, in the very large majority of the countries in the region, one can only sporadically still see the more diluted versions of liquid detergents on the shelves. Also in (mainly smaller) countries where diluted products are still accounting for an important share of the market, one can expect that this situation will evolve towards the more concentrated products. Importantly, none of the participants to *LSP-L* moved back to the diluted liquid detergents form after completion of the project, thus maintaining the sustainability benefits, and still expanding them over the years to come.

It is worth noting that, around the time of deployment of *LSP-L*, a new generation of “super-concentrated” laundry liquid detergents had started to gain importance. These products have recommended dosages as low as 30-40 ml per wash, i.e., at 50% of the dosage of the maximum target set by *LSP-L*. This is an important indication that the technology had further progressed and new innovative executions were becoming available. This suggested to the Industry to consider a second step in the concentration of liquid detergents (similar to powders, for which there had been three steps). As a result, a follow-up to the *LSP-L* initiative, *PREP-L2*, was opened in April 2016 and activated on April 1, 2017.

Finally, the achievements of *LSP-L* show that the Detergent Industry as a whole clearly understood and appreciated the sustainability value and potential of such an industry-wide initiative. The large majority of companies joined and supported the project and its harmonised communication campaign, thus making it possible for such campaign to reach a very large number of consumers. Equally importantly, a majority of consumers appear to have adapted their dosage habits to the new reduced levels, which suggests that they have understood the messages transmitted by the educational PR-campaigns and the benefits of compacted detergents.



Annex 1 - LSP-L Project Description

The *LSP-L* project description can be found on the A.I.S.E. web site:

“Our activities” → “Sustainable cleaning” → “Product resource efficiency projects”

The direct link is:

[https://www.aise.eu/documents/document/20160229142408-16-02-01_prep-l2_project_description_final_\(3\).pdf](https://www.aise.eu/documents/document/20160229142408-16-02-01_prep-l2_project_description_final_(3).pdf)

