



Substitution of Pb stabilizers in PVC , a 15 years journey

7 November 2018, Antwerp

Stimulation of Substitution within circular Economy perspective, in the metals sector: *concepts and examples*

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- Function
- Why substitution?
- VinylPlus® Voluntary Commitment
- Path to substitution
- Ensuring continued recycling

Lead Stabilisers

Why were they used for?

- PVC, like all thermoplastics, must be stabilised to protect the articles ; as such, it does also contribute to maximise the use of resources.
- Lead salts (like other metals) are efficient stabilisers for PVC, remaining firmly embedded in the plastic matrix.

Why were they substituted?

- In 2000, the Vinyl 2010 supply chain initiative was built around a Voluntary Commitment, which includes, among other objectives, the replacement of lead stabilisers in the EU by the end of 2015.



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Resins

Stabilisers

Plasticisers

Converters

200 companies



The Natural Step **NGO**

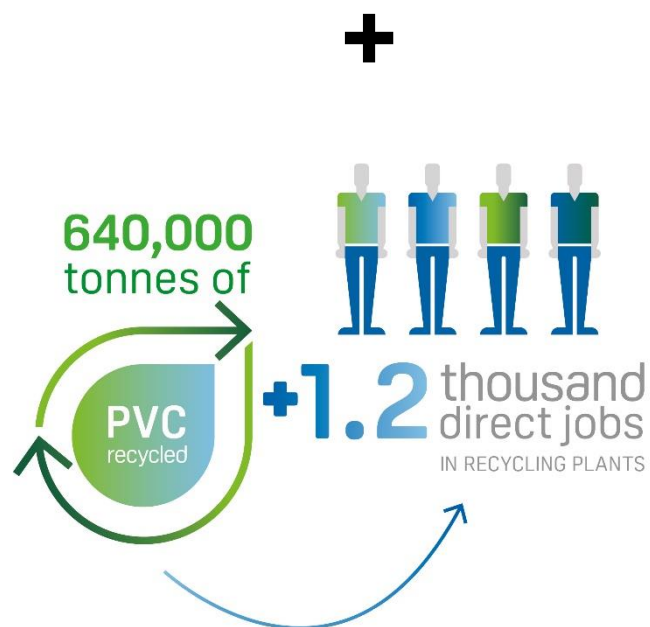


150 Recycler partners

recovinyl^{plus}

Key figures of the European PVC industry (EU 28+2)

- Turnover : 20 billion €
- 20 000 companies (most of them SMEs)
- Direct employment : 160 000 jobs (excluding installers)



35 measurable and concrete targets organised around 5 challenges

1. Controlled-loop Management

(waste management, recycling, use of recycled PVC)

2. Organochlorines

(emissions, transportation)

3. Sustainable use of additives

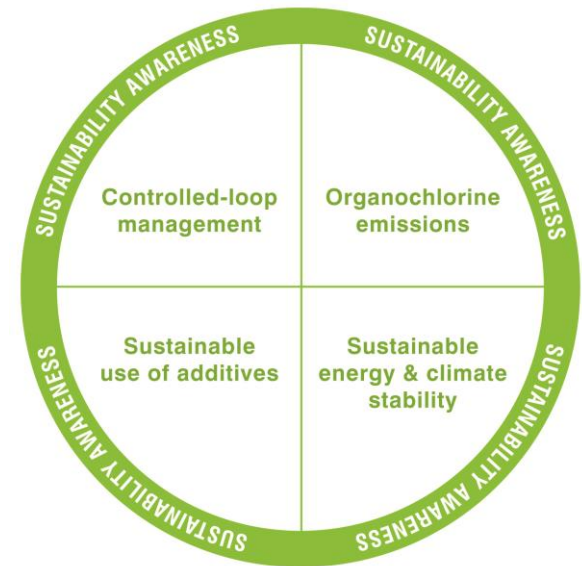
(responsible 'recipe')

4. Energy efficiency

(reduction of consumption)

5. Sustainability awareness

(transparency, accountability and stakeholder engagement)

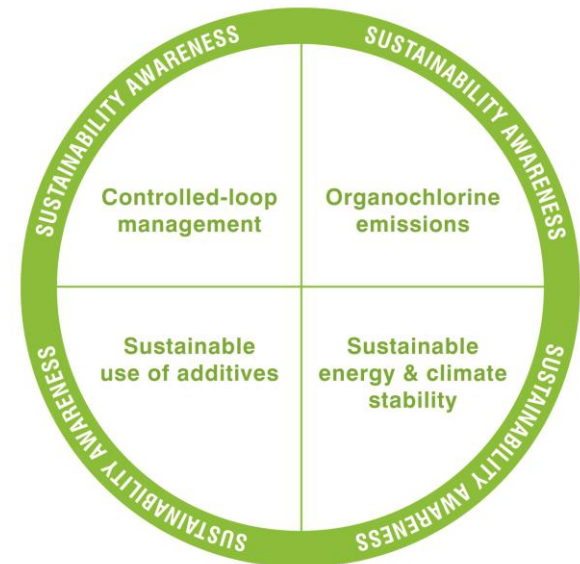


Based on
The Natural Step System Conditions
for a Sustainable Society

35 measurable and concrete targets organised around 5 challenges

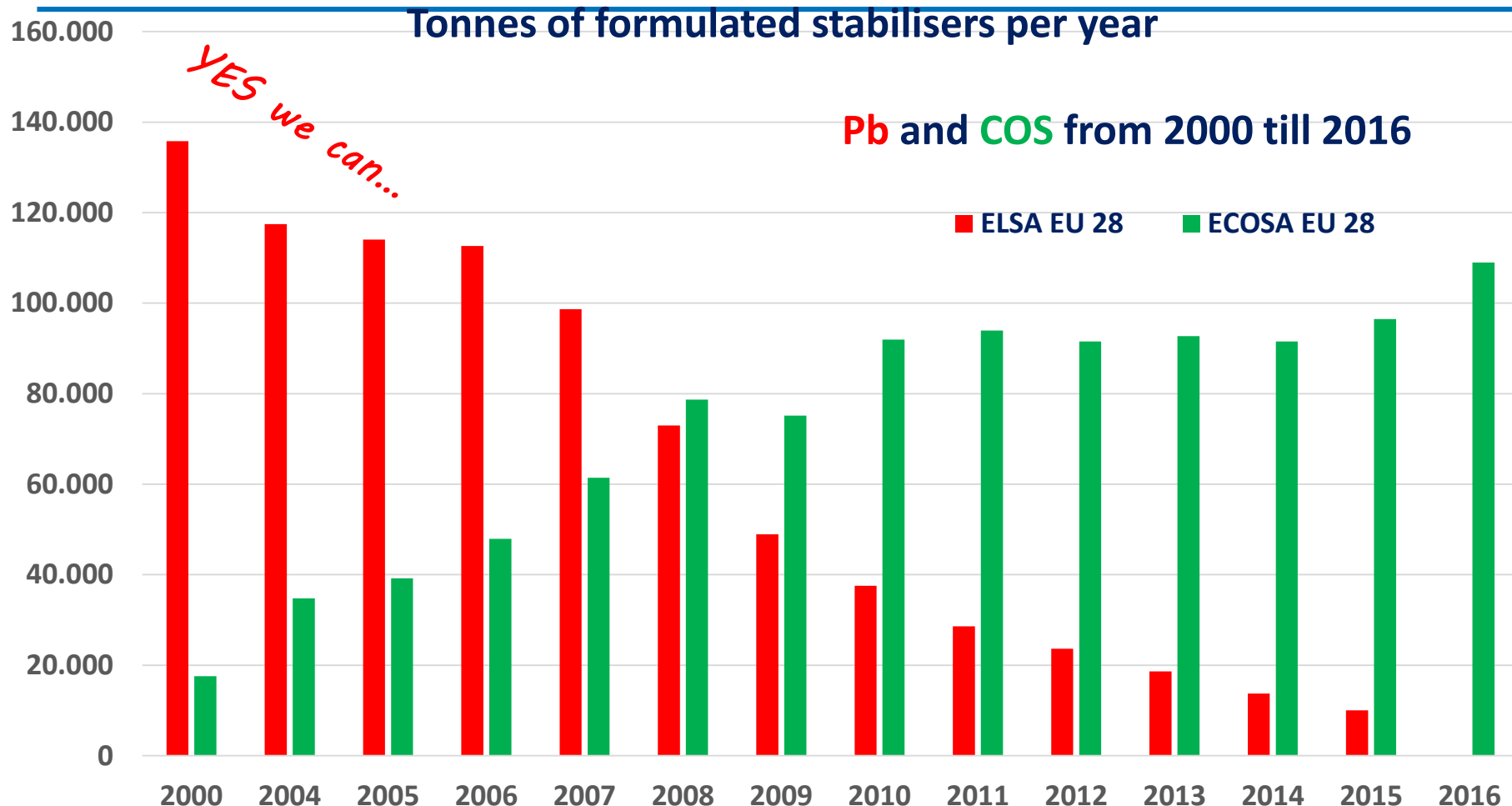
Sustainable use of additives

- **Voluntary substitution of virgin stabilizers**
 - Cd in 2000
 - Pb by 2015
- **Studies on additives hazards and risks during use**
- **Manage legacy additives**
- **One step beyond: additives sustainability footprint**



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The last 15 years....



Source ESPA

ELSA – European Lead Stabilisers Association ECOSA – European Calcium Organic Stabilisers Association

COS – Calcium-based Stabilisers Pb – Lead-based Stabilisers

... and we did it!

This is a success example of the European PVC industry voluntary commitment



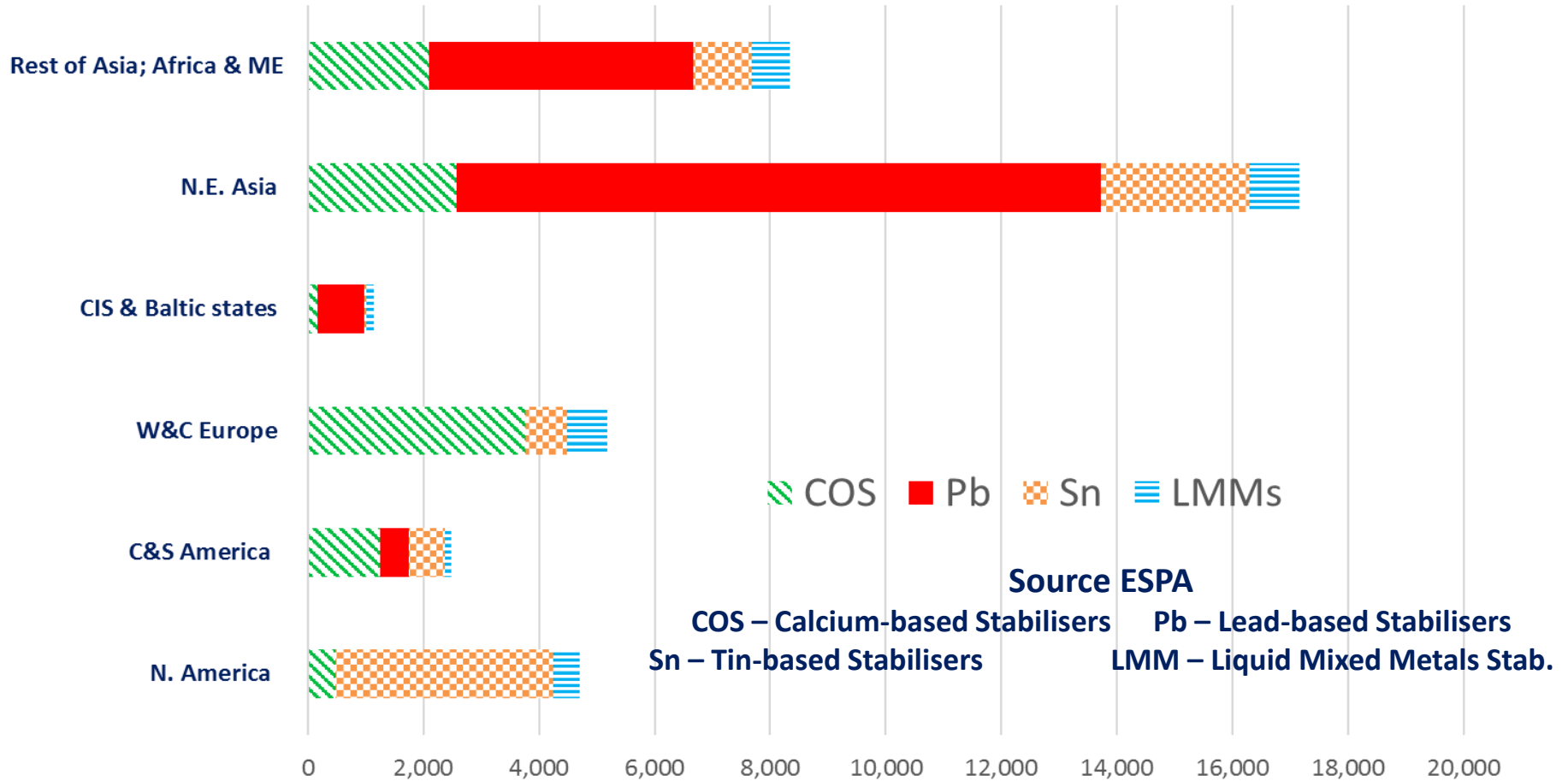
We can proudly say that we have achieved our goal to “replace Pb-based stabilisers in PVC applications in the EU-28, by the end of 2015”.

This was inspected and confirmed by an external audit company.

- Initially a price difference with alternatives
- Need R&D and adapt processes
- Facilitation by stabilisers producers in order to find technical solutions and ensure maintained performance and quality
- Tens of millions of € have been invested to ensure the transition

But there is still a long road ahead for the global PVC industry vinyl^{plus}

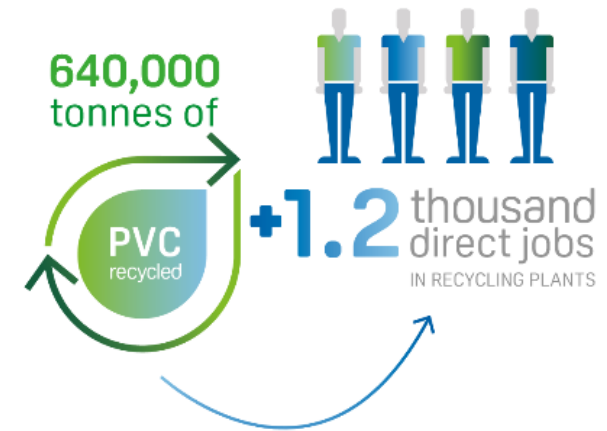
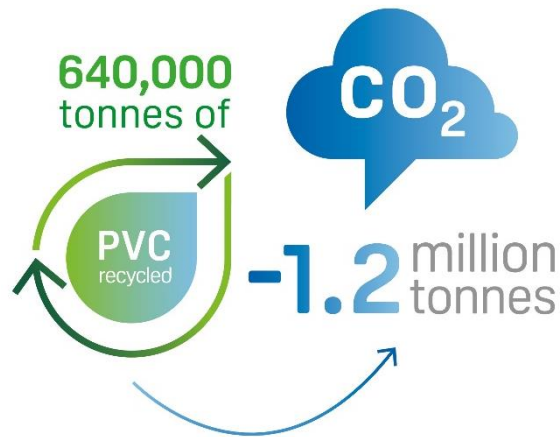
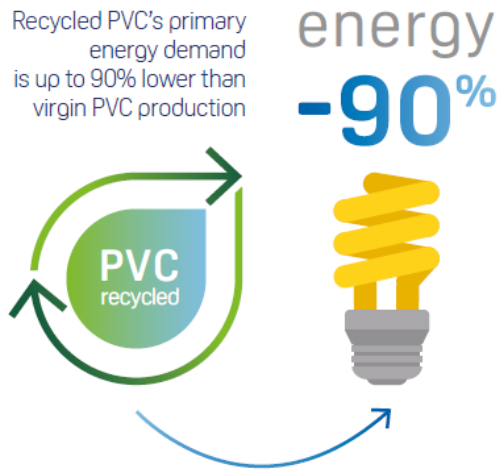
Figure II: how in the world PVC resin (expressed in K tonnes) is stabilised (2015)



- Following the achievement of the Voluntary Commitment and the substitution of virgin Pb stabilizer use for the manufacture of PVC articles, Echa has been mandated to prepare a restriction dossier.
- **Aim :**
 - Contribute to Pb release minimization as advised by EFSA (to avoid potential impact on children intellectual development through higher blood pressure)
 - Formalize and confirm industry voluntary commitment achievements
 - Avoid Pb in imported PVC products (esp. Since PVC import tend to increase in the last years)
- Annex XV report submitted in December 2016
- Final Echa opinion in February 2018

Benefits Associated with PVC Recycling

Recycled PVC's primary energy demand is up to 90% lower than virgin PVC production



CO₂ savings of up to 90% are achieved when PVC is recycled: recycled PVC's primary energy demand is typically between 45% to 90% lower than virgin PVC production (depending on type of PVC and the recycling process).

For each kg of PVC recycled, 2 kg of CO₂ are saved (according to a conservative estimation). On this basis, CO₂ savings from PVC recycling in Europe is now at around 1.2 Mt/year.

On average one employee is needed to recycle 500 t/year of PVC (TAUW study). Hence the **639,648 tonnes of PVC recycled in 2017 contributed to the creation of more than 1,200 direct jobs in recycling plants.**

- PVC with Pb stabilisers has been used in mainly long life applications from the construction sector
 - Window and pipes : average lifetime between 50 and 100 years
 - Cables : average lifetime : about 25 years
- For rigid PVC, the proposed restriction by Echa confirms that recycling is the waste management option leading to the lowest releases of Pb in the environment, therefore a risk management measure in itself
- It furthermore reduces exposure potential by excluding direct indoor contact or potential high contact to skin (hence multilayer outdoor decking favoured)
- **Note VinylPlus : the analysis for Pb in recycled products is different from the introduction of Pb virgin stabilizer in new products: Pb in recycle originates from waste and hence is already in the EU environment/technosphere. The objective is to minimize release of existing « Pb reservoir ». Addition of new virgin Pb stabilizer increases the Pb accumulated in the environment.**

- For soft PVC, the Echa follows the same approach :
 - Monolayer product allowed for mats for stables and greenhouses
 - Multilayer hoses, traffic management, road furniture, roofing and waterproofing, professional footwear provided enclosed in a layer of virgin PVC
- Applying the restriction as such immediately equates to a ban of 121 kT recycled products since current products are monolayers
- And a loss of societal benefit of 233 million € per year compared to landfill and 316 million € per year compared to the incineration

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- SEAC acknowledges that whilst there may be technical alternatives, those are not tested or available at industrial scale immediately.
 - SEAC could not recommend a specific transition period
 - EC now to formulate proposal
 - Time to market of new applications estimate : 7 to 8 years
 - Research 4 to 5 years
 - Industrial implementation +3 years
 - Also need more technology options that encapsulation in a PVC layer (use of other materials, coatings...)

Preventing legacy additive challenges : Additive Sustainability Footprint

- **Voluntary** tool to **assess** and **promote** the sustainable production and use of additives in PVC products. Assessment done over the **entire life cycle** of the additive and its use in a finished article.
- Qualitative, top-down approach to identify **sustainability hotspots** vs. the science-based TNS definition of sustainability.
- Tool using **ISO compliant inputs** (LCA data, EPD), expert judgement and guidance from sustainability experts (TNS).
- **Complement** but does not replace the more quantitative, bottom-up LCA schemes, such as EPDs and PEFs.
- Takes a **wider perspective** (incl. societal) allowing to identify innovative pathways towards improved sustainability.

