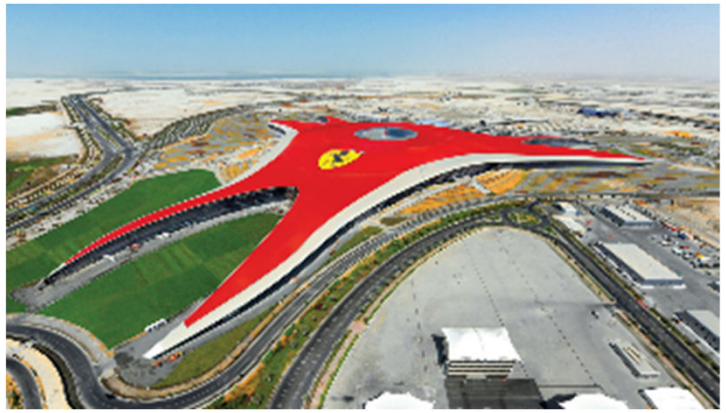
The Use of Fluoropolymers in the Coil Coating Industry



ECCA

BCR meeting
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- Fluoropolymers used in the industry
- Life cycle perspective
  - Coil coating
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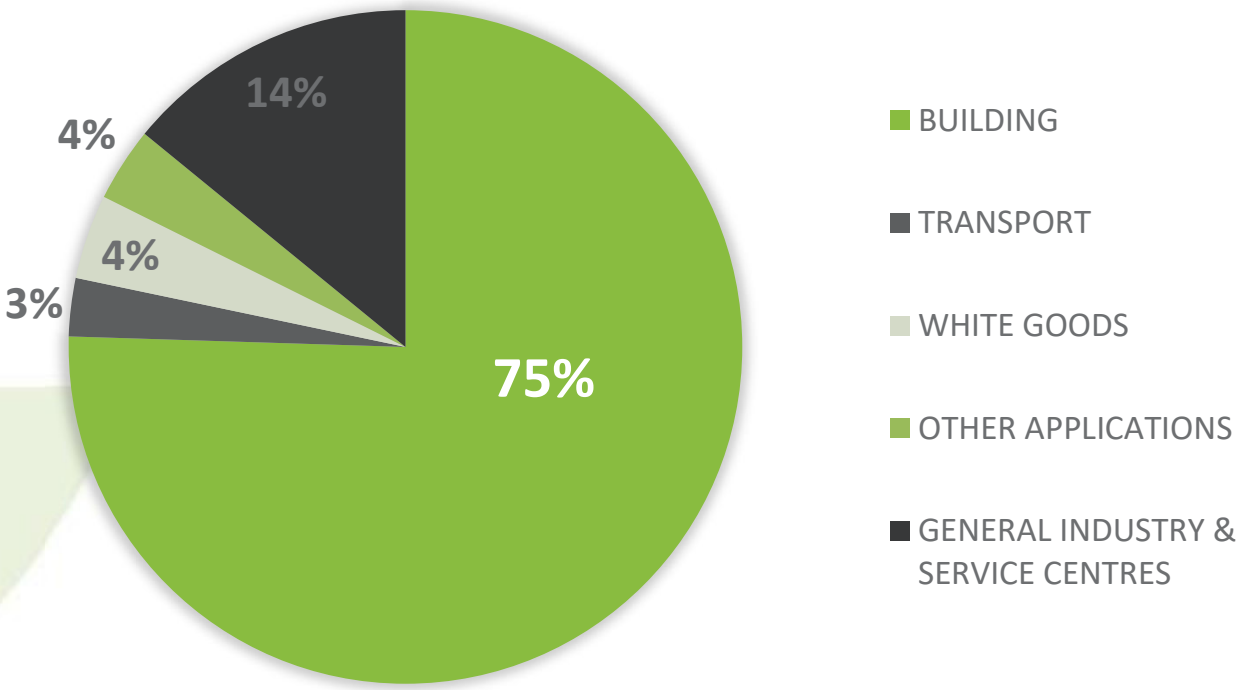
- Summary

European Coil Coating Market 2022

- Shipments:
  - 5 371 kt (*) /1 380 km² and 190 kt paint
  - 80% Steel / 20% Aluminium (in m²)

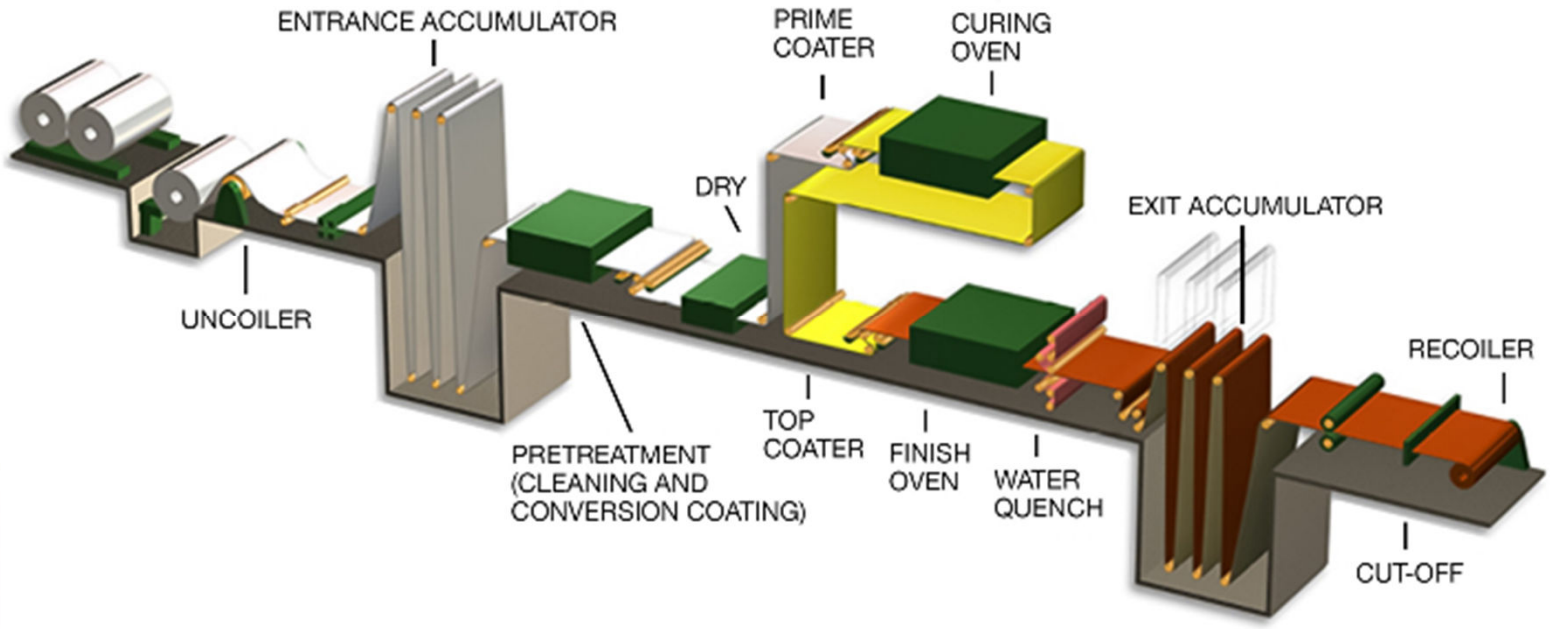


(*) ~10 % produced in Belgium

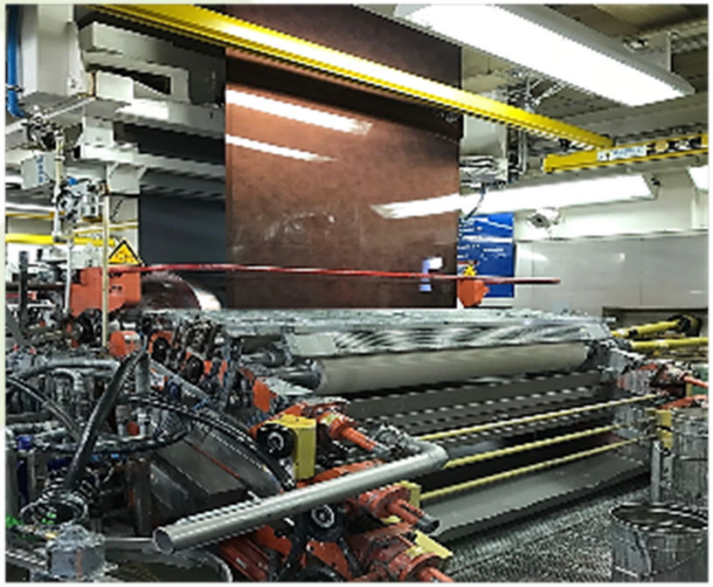
Coil Coating – Process

The definition of a coil coating process according to EN-10169-1:2022 is:

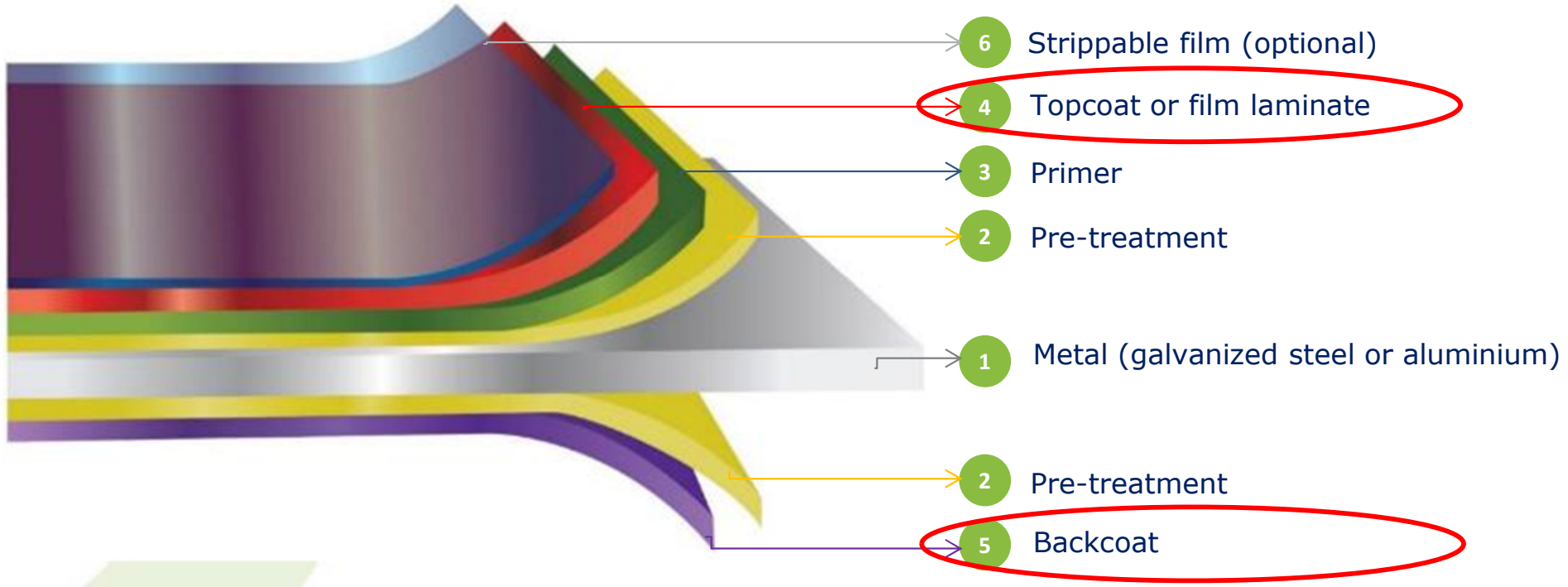
'A process in which an (organic) coating material is applied on rolled metal strip in a continuous process which includes cleaning and chemical pretreatment of the metal surface and either one-side or two-side, single or multiple application of (liquid) paints or coating powders which are subsequently cured or/and laminating with permanent plastic films'.



Coil Coating Process



Typical composition of a coil coated (prepainted metal) product



Fluoropolymers are used as:

- **Topcoats – PVDF or FEVE**
- **Additives e.g., PTFE-containing waxes in other topcoats or backcoats.**

PVDF coatings are used for Roofing and Cladding of buildings

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EN 10169:2021 (E)

Table 8 — Requirements for the UV resistance for natural and artificial testing conditions

Requirements	UV resistance category							
	R_{uv2}	R_{uv3}		R_{uv4}		R_{uv5}	
Test duration, natural exposure (years)	2	2		2		4	
Test duration[e], artificial UV radiation (h)	2 000	2 000		2 000		4 000	
Maximum colour change ΔE^{*}[a] before and after the test (CIELab units)	5	3		3[c]	2[d]	3[c]	2[d]
Minimum retained gloss after the test (RG[b]), %	30	50[c]	60[d]	80		80	

PVDF and FEVE coatings provide the market with highly durable, very aesthetic products.

Product warranties of 25-40 years; service lives >> 50 years.

For demanding environments (high UV, marine, sand, industrial) the combination of properties in a PVDF or FEVE coatings is superior to other coating technologies used in the industry.

PTFE waxes are used almost systematically in all PUR and PE topcoats, and approx. 50% of epoxy backcoats

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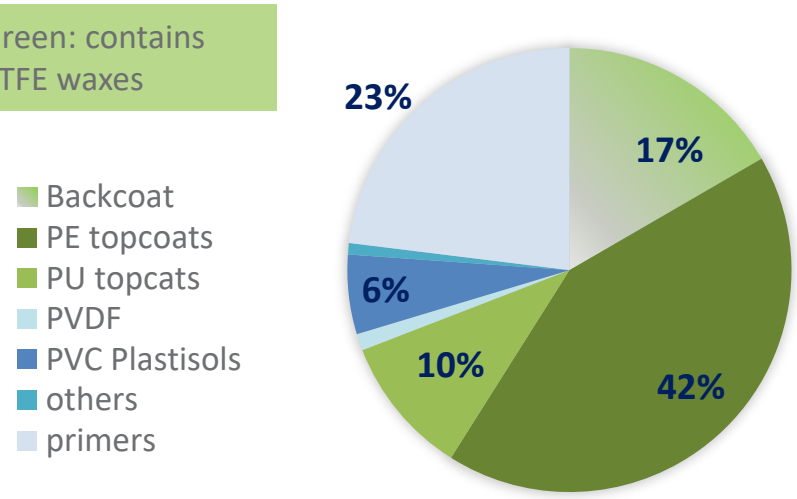
2022 PAINT VOLUMES

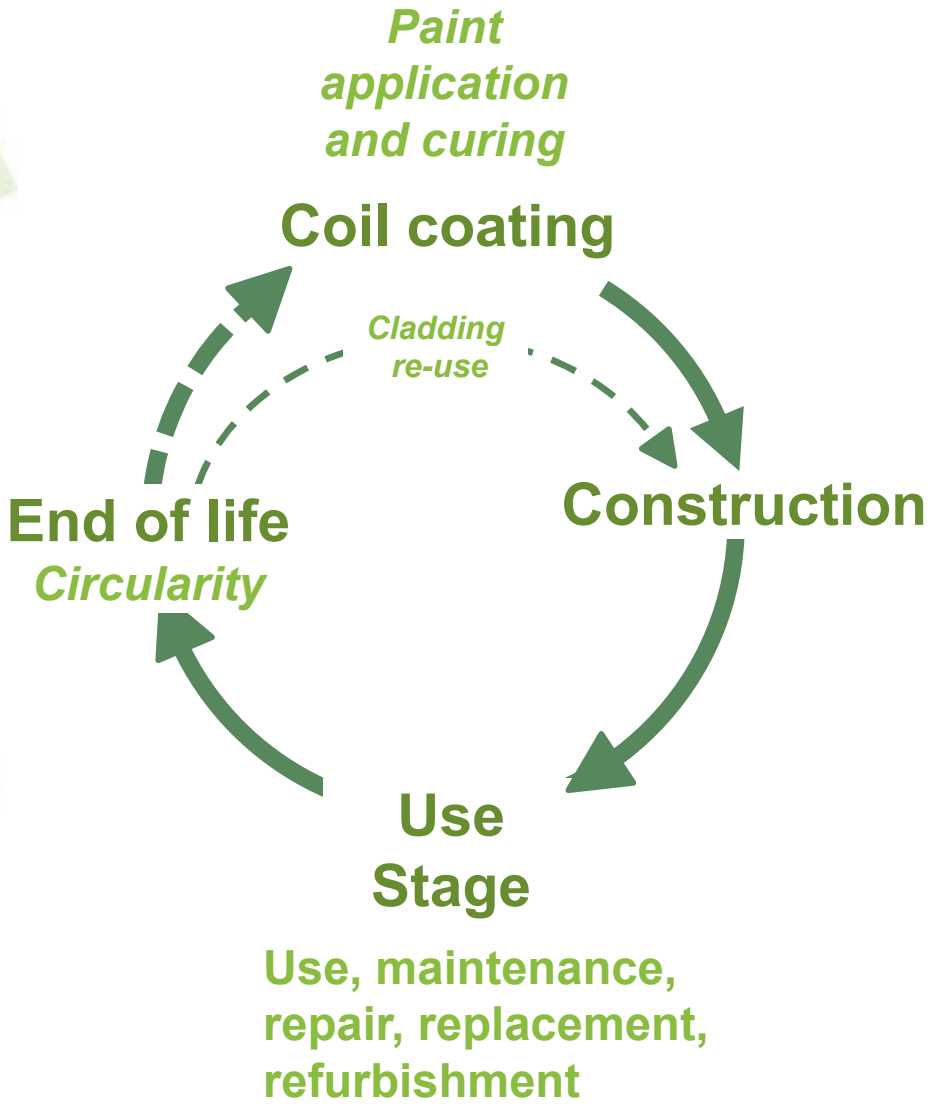
Green: contains PTFE waxes



- To provide scratch resistance.
- To improve gliding / slipping of back coats
- Contribute to wrinkle aspect
- Contribute to fretting properties *(avoid scratches within coils or between stacked sheets/panels during transport)*

PTFE waxes are ubiquitous in coil coating, with the exception of primers.

PVDF coated metal - Life Cycle

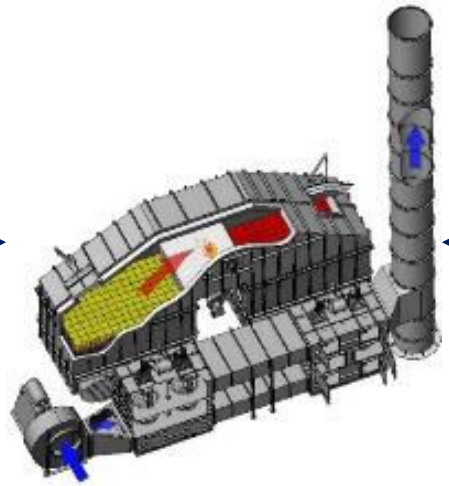


Emission control on a coil coating line

All emission levels are defined by the STS BREF as part of the Industrial Emissions Directive

Paint is applied via roller coating in controlled spaces with extraction systems.

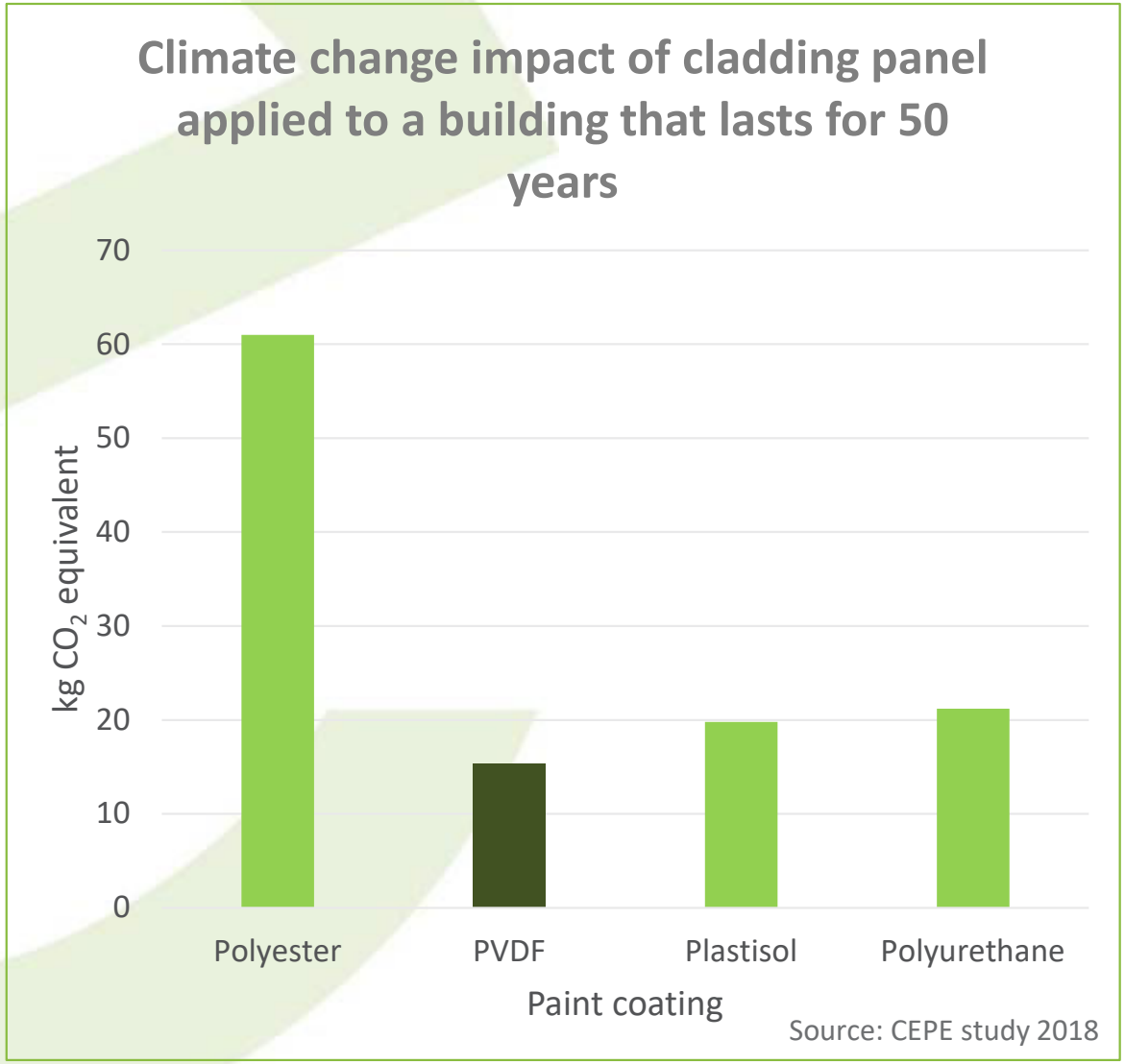
Unused paint is returned to main paint store and recycled by paint supplier.



Regenerative Thermal Oxidiser (RTO)

Very unlikely that PVDF or FEVE coatings or PTFE waxes are released to the environment during the coil coating process.
The applied paint is fully cured in the oven to generate the solid coating.

In service performance of PVDF coated metal

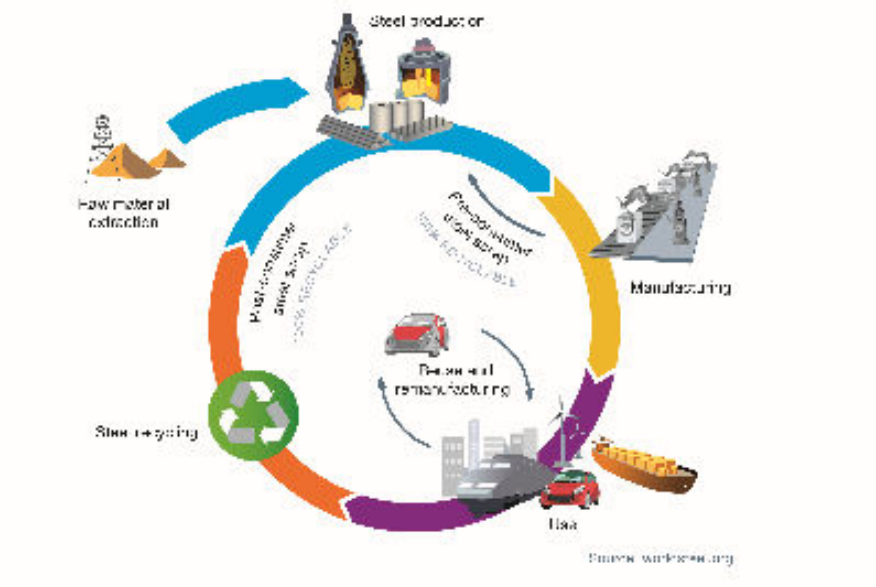


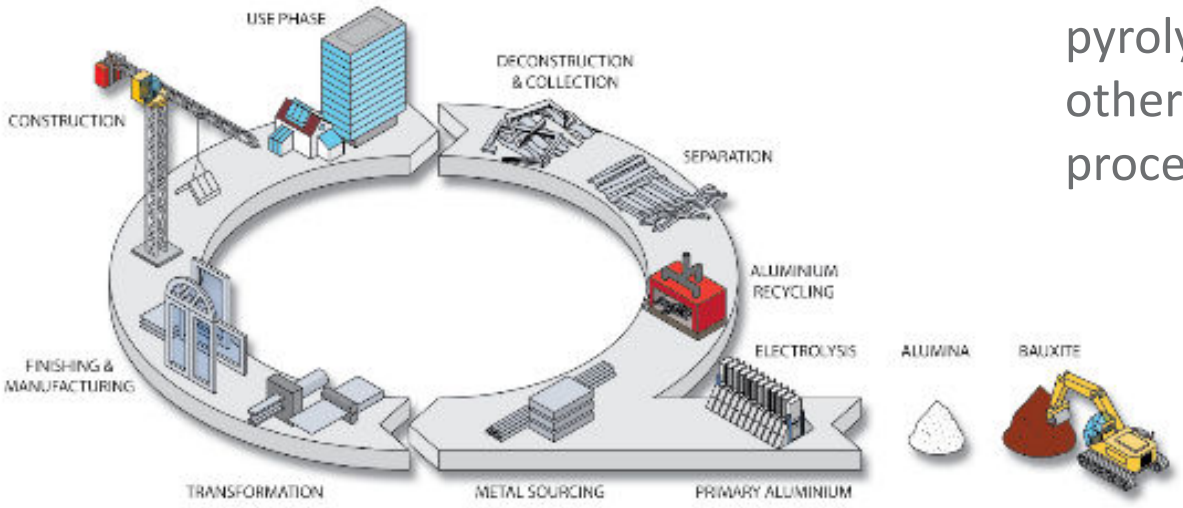
The high durability of the PVDF coating reduces the need for:

(a) Replacement of the cladding over the full service life. (Replacement requires the use of new raw materials).

(b) Frequent maintenance and repainting. (Avoiding the liberation of solvents (GHG's) into the atmosphere during the repainting process.)

Recycling of PVDF/FEVE coated metal





Prepainted metal is recycled through a well-established and effective network of recycling centres in Europe.

The ease of removing and separating prepainted metal cladding from other building waste facilitates very high rates of recycling and reuse.

The PVDF/FEVE coating is destroyed by pyrolysis and the fluorine captured with other waste products generated in the process.

Summary

- Prepainted (coil coated) metal products are produced under well controlled manufacturing conditions.
- Coil coated metals are always recycled or reused at end of life. Coatings are destroyed during the high temperature metal recycling operation.

Fluoropolymers play an important role in the coil coating industry

- PVDF and FEVE offer numerous performance advantages over alternative coil coatings in niche markets (harsh environment), **without equivalent**
  - High-added value products, stakes for the European Coil Coating industry are estimated at €320 m euros per year

- PTFE waxes are ubiquitous in coatings used. A ban on their use entails:
  - a huge substitution and re-homologation effort spanning over 4 levels of supply chain (resins& wax manufacturers, paint formulators, coil coaters, coated metal users)
  - will require an estimated 5 years at the level of coil coaters
  - a yet unassessed duration for development and upscaling efforts by paint formulators and waxes manufacturers.

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