

13th UIC Sustainability Conference



Recyclability of rolling stocks

Levers for recyclable trains

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ALSTOM
Designing fluidity

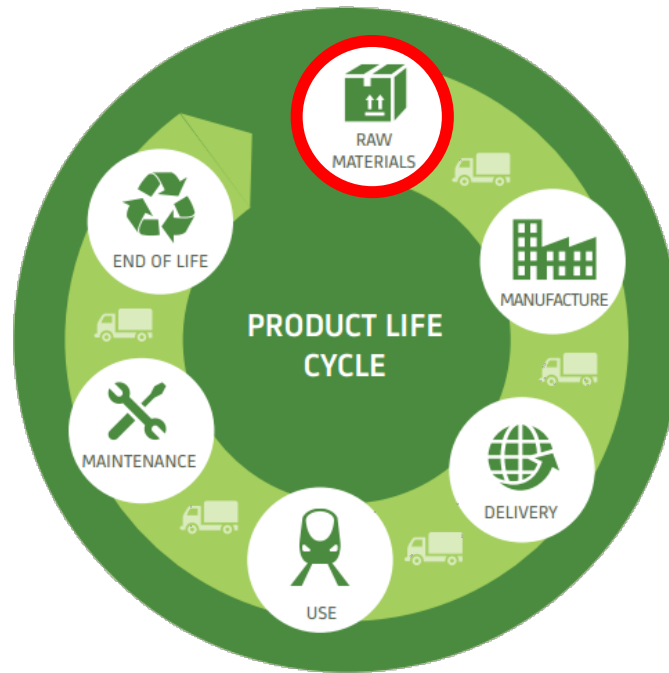


12, 13, 14 October 2016

Levers for recyclable trains



Up to 45% of life cycle impact
Mainly raw material depletion



**Let's contribute to
circular economy !**



Levers for recyclable trains



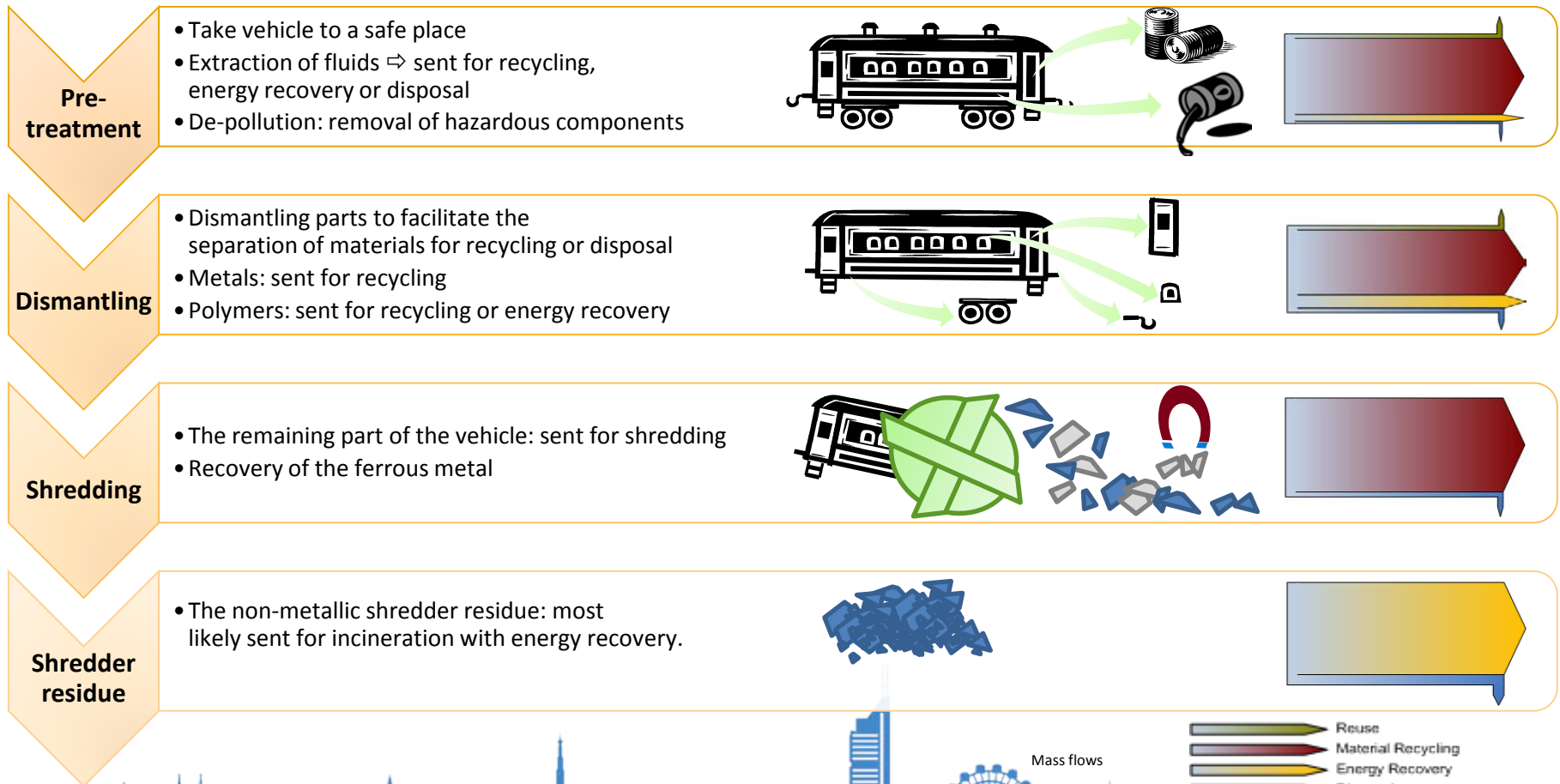
- Specific network for train dismantling is now developing
- Strong regard on safety, environmental and recycling performance



Levers for recyclable trains

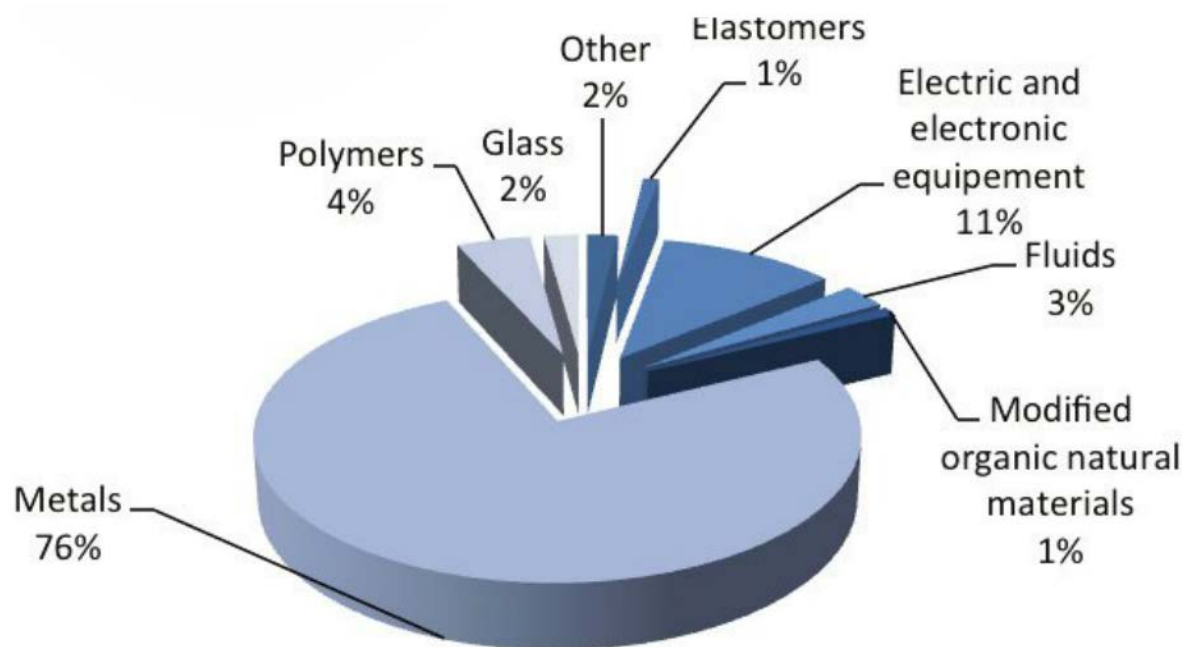


Typical recycling process: UNIFE TecRec (UNI-LCA-001:00)



Levers for recyclable trains

Typical train material content:



Levers for recyclable trains



Hazardous
materials



Maturity and
efficiency of
recycling process



Incompatibility
of materials

Return of experience



ALSTOM strategy

1. Hazardous substances
2. Choice of materials
3. Provide information



ALSTOM strategy - Substances



- Hazardous substances limitation:

1

- Integration of constraint in process and strategy

2

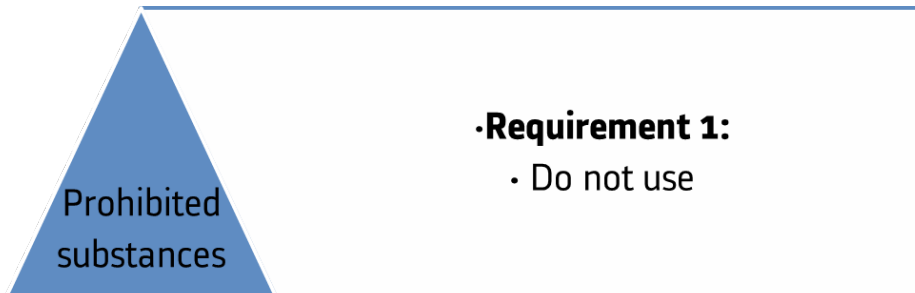
- Use of UNIFE Railway Industry Substance List (RISL) to identify substances in articles

3

- Substitute gradually substances of concern



ALSTOM strategy - Substances



**Gradual
substitution**



ALSTOM strategy - Substances



- Substitution is a way to make end-of-life easier:

- Avoid emissions during incineration
- Avoid dismantling operators exposition
- Avoid additional costs



ALSTOM strategy - Materials



1. Prefer recyclable materials



Epoxy, bakelite



Mineral Wool



PP, PET, ABS



Polyester fiber



ALSTOM strategy - Materials

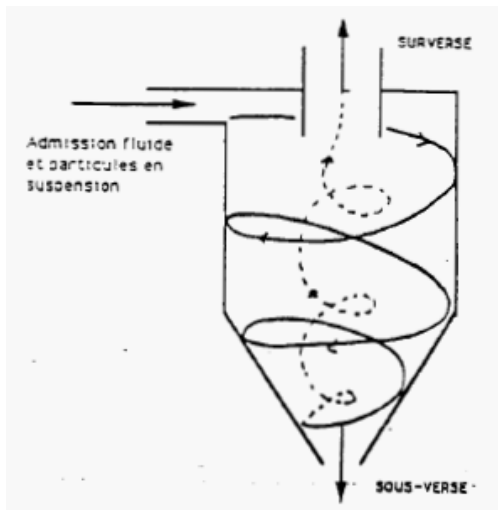
1. Prefer recyclable materials
2. Prefer monomaterial parts



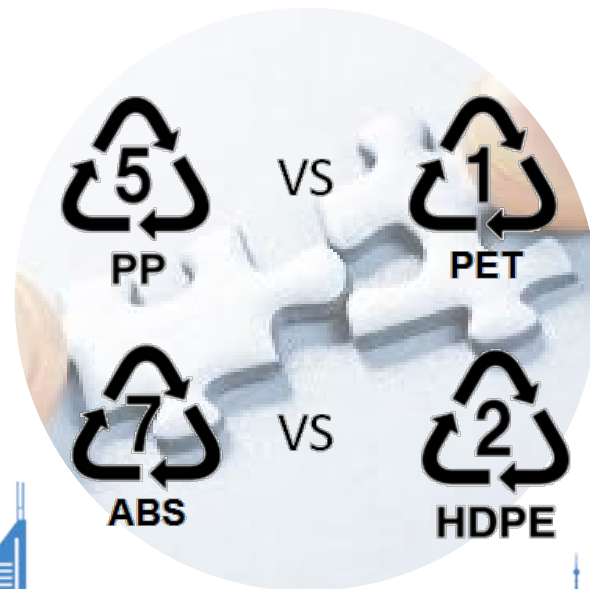
ALSTOM strategy - Materials



1. Prefer recyclable materials
2. Prefer monomaterial parts
3. Use only separable materials together



Densimetric separation



ALSTOM strategy - Information



- Providing information
- Hazardous substances declaration
- End-of-Life Manual
 - Material composition
 - Guidance for dismantling

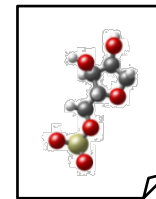
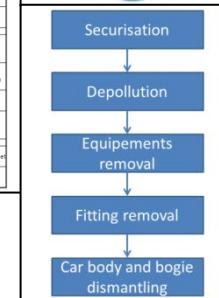
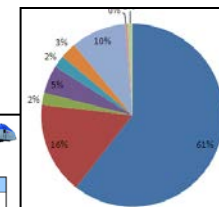


FIGURE 1 - Vue du matériel RECYCLES

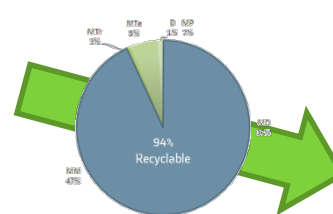
CRITERES	CARACTERISTIQUES	DETAILS
Genre	Catégorie Polyvalent de déchets PAV	120 tonnes de déchets au total - 2 Véhicules d'entretien VET et VET - 2 Véhicules d'entretien VET et VET
Modèle	Regional, circulation en France	1 Véhicule PAV 1 Véhicule PAV
Catégorie	Elément de la classe	1 Véhicule PAV 1 Véhicule PAV
Classe	Elément de la classe	1 Véhicule PAV 1 Véhicule PAV
Alimentation	Directe	Alimentation électrique par prise de courant Alimentation électrique par prise de courant
Alimentation	Indirecte	Alimentation électrique par prise de courant Alimentation électrique par prise de courant
Certificat de conformité	Conforme aux normes	Conforme aux normes Conforme aux normes
Informations	Communication et affichage	Communication et affichage Communication et affichage
Sécurité	Conformité aux normes	Conformité aux normes Conformité aux normes
Bagagerie	Elément de la classe	Elément de la classe Elément de la classe
VM	VM standard aux VET	VM standard aux VET VM standard aux VET



ALSTOM examples



- CORADIA Polyvalent:
 - Contains more than **32 t** of recycled materials (waste)
 - **93 %** Recyclable and **98,5 %** recoverable (ISO 22628)
 - End of life manual describes scraping activities and provide recommendations on reclaiming and recycling



ALSTOM examples

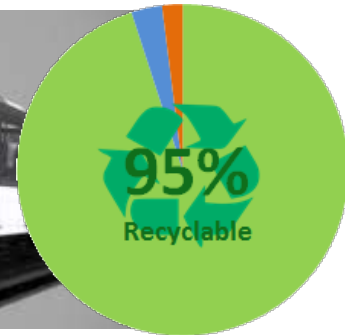


TGV Euroduplex

97,5% recoverable



98% recoverable



Metro MP14

98% recoverable



Tramway CITADIS



Recyclability of Rolling Stock



Other options...



...thank you for your attention !

