ARN Advisory
sustainability expertise

Recyclability of lightweight automotive materials

Mobilis Conference
S_Life / E_Light Session

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Plastics in the automotive material mix

1. A long term trend: Less steel, more plastics
2. More diversification in plastic types
3. Existing composites : Multilayer materials (plastics)
4. New composites : Multilayer / Fibre reinforced materials
5. Plastics breakdown trend > increase of plastics share 7.6% -> 9.2%

Polymer	2001	2011
PP	22.1%	23.9%
PU	19.3%	15.4%
Nylon	12.4%	12.2%
PVC	7.9%	7.9%
ABS	7.4%	6.4%
PE	4.4%	4.8%
PCB	3.9%	5.4%
Engineering Plastics	10.9%	12.9%
PVB	2.1%	1.9%
Other	9.6%	9.2%
	100%	100%

What gets in, once comes out of an End-of-Life Vehicle!

Optional Recycling routes of ELV plastics

1. Manual dismantling

2. Incineration of shredder residue

3. Separation through
   Post Shredding Technology

ARN Results 2011	
195.052 ELVs	**ELV weight 1016 kg**
Product REUSE	23.5%
Material RECYCLING	59.6%
Energy RECOVERY	13.1%
Reuse+Recycling	***83,1%***
Energy recovery	***96,2%***

Why to recycle post-consumer automotive plastics

1. Legislation: ELV directive requires 95% recyling & recovery of which maximized 10% energy recovery
2. Resource Strategy: Developing a 'recycling society'
3. CO2 reduction: lightweight vehicles increase the well-to-grave emissions.

Traditional CO2 emission presumption – from well to grave

Production Vehicle Usage Recycling

Future CO2 emission presumption – from well to grave

Production Vehicle Usage Recycling

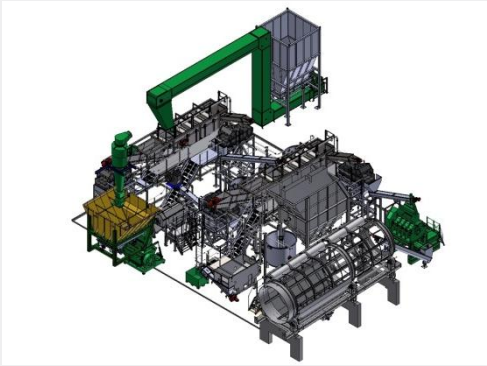
How do lightweight plastic composites perform in PST?

1. Thermoplastics are recuperated through sink float medium separation:

   <1.1 gr/ccm : PP, PE, ABS, PS, PPtf

   1.1-1.3 gr/ccm: Miscellaneous

   >1,3 gr/ccm: a.o. PVC



2. Light weight composites end up in sink fraction (>1,3) due to its high density

3. Due to presence of Chlorides in sink fraction, recycling is impossible and even incineration is difficult and expensive

4. Alternatively manual dismantling is not economically sustainable due to manual labour cost

Current sink float separation technology unsufficient to recover lightweight composites

The merits of automotive plastics material recycling

1. Technology to recycle Shredder Residue is rapidly developing

2. Many applications can benefit from regranulate addition

3. Automotive plastics recycling can benefit from know how and economies of scale of well regulated WEEE- and packaging plastic waste recycling

4. Economics of scale will eventually bring about positive residual material value

5. In support of sustainability and material resource efficiency