P. Viseu
Tecnologia e Gestão Viseu

Departamento de
Ambiente

Assessment of Energetic Potential from Automobile Industry Textile Wastes – Potential for RDF Production

Elisabete Silva and Isabel Brás

Introduction and Goals

- Textile materials in automobiles
- Seat covers, carpets, roof liners and door liners
- Generates annually significant amounts of textile wastes (TW)
- Circularity in automobile industry

Introduction and Goals

- Refuse Derive Fuel (RDF)

↓

Solid fuel prepared from non-hazardous waste

↓

NP 4486:2008

Introduction and Goals

- Evaluate the energetic potential of the RDF obtained from automobile industry textile wastes (TW)
- Assess the influence of their mix with undifferentiated urban wastes (UW)
- Promote the deviation waste from landfills and the circularity of the sector

Methodology

1. Physical characterization of samples

2. Production of RDF pellets

3. Characterization of RDF using Fuels European standards

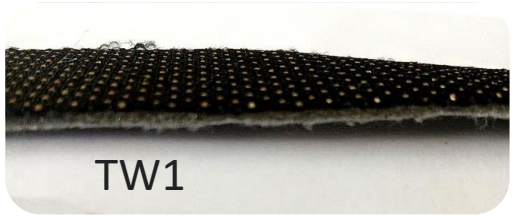
P. Viseu
Tecnologia e Gestão Viseu

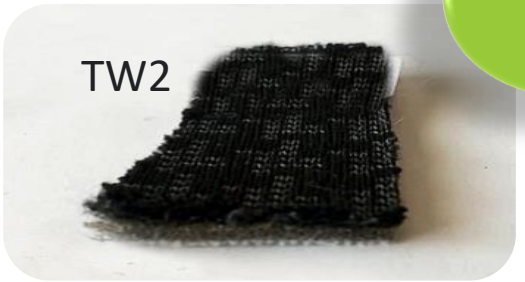
Physical Characterization

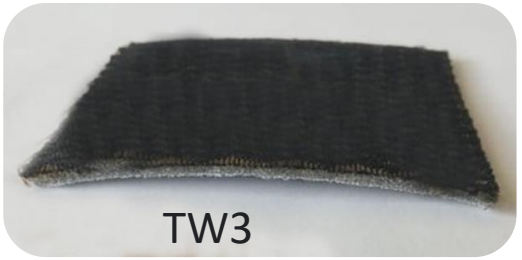
Composition and moisture content

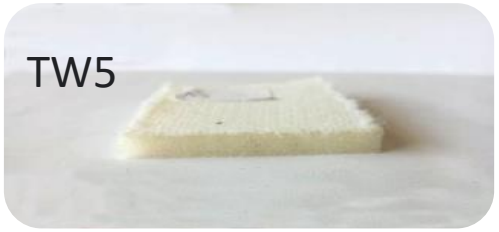
Methodology

Six different types of TW automobile seats









Source: Automobile Industry

TW

UW

TW:UW

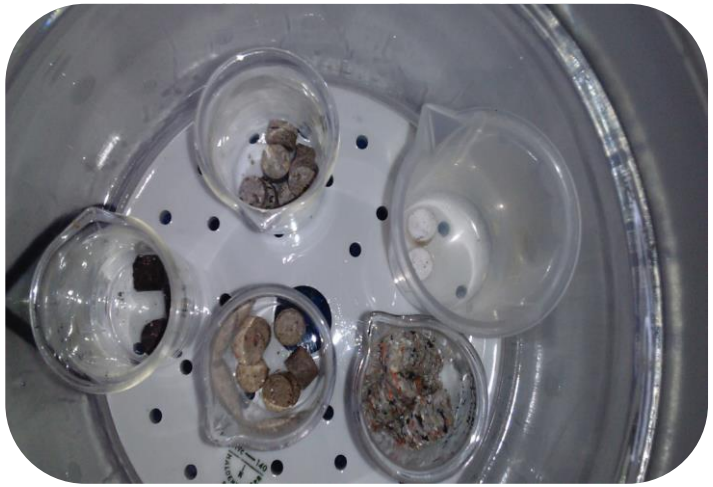
Source: Mechanical Biological Treatment of Urban Wastes

RDF Pellets Production

Methodology

Milled

Pressed



Characterization using Fuels European Standards NP 4486:2008

Methodology

Oxygen filling

Calorimeter

Calorimetric bomb

Heating Value (HV) Content (Calorimetric system)

Total Chlorine (Calorimetric system – decomposition vessel)

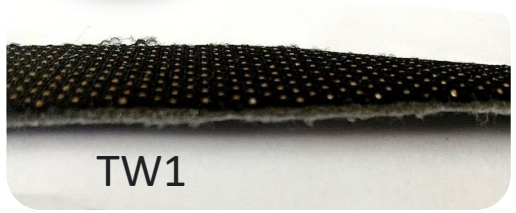
Mohr's method

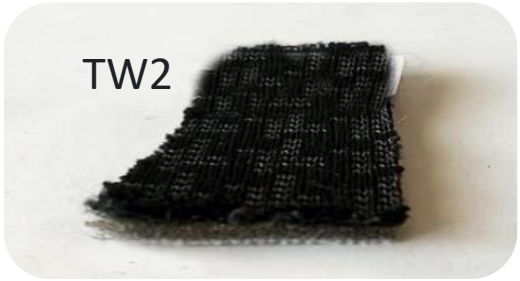
Chlorine Quantification

Physical Characterization

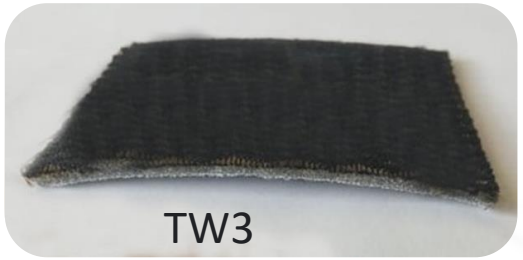
Results

TW

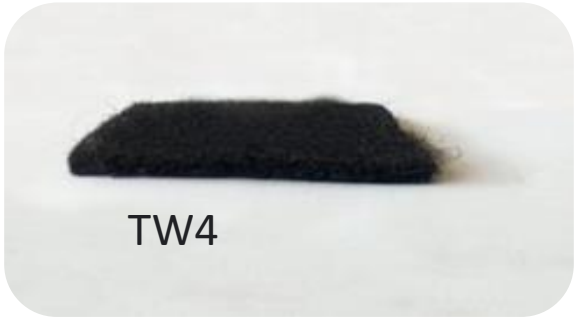




- European List of Waste - 040222
- Non dangereous wastes
- Textile fibers=> polyester
- Foams => organic materials based on polyol and isocyanate - polyurethane



White textile fiber, a foam and a black textile fiber



Black textile fiber

White textile fiber and a foam

Higher foam layer

Physical Characterization

Results

UW

59% textile, wood

29% paper/cardboard

6% plastic

6% other energetic materials

Samples	Moisture (%)
TW1	0.62
TW2	0.58
TW3	0.42
TW4	0.23
TW5	1.10
TW6	0.84
UW	3.24

Low moisture content

RDF Pellets Characterization

Heating Value

Results

	TW1	TW 2	TW 3	TW 4	TW 5	TW 6	UW	TW:UW (1:1)
HV (MJ/kg)	24.4±0.042	24.4±0.064	23.4±0.016	23.5±0.007	29.9±0.017	27.4±0.099	23.6±0.143	24.2±0.105

RDF pellets with higher foam layer registered highest heating values

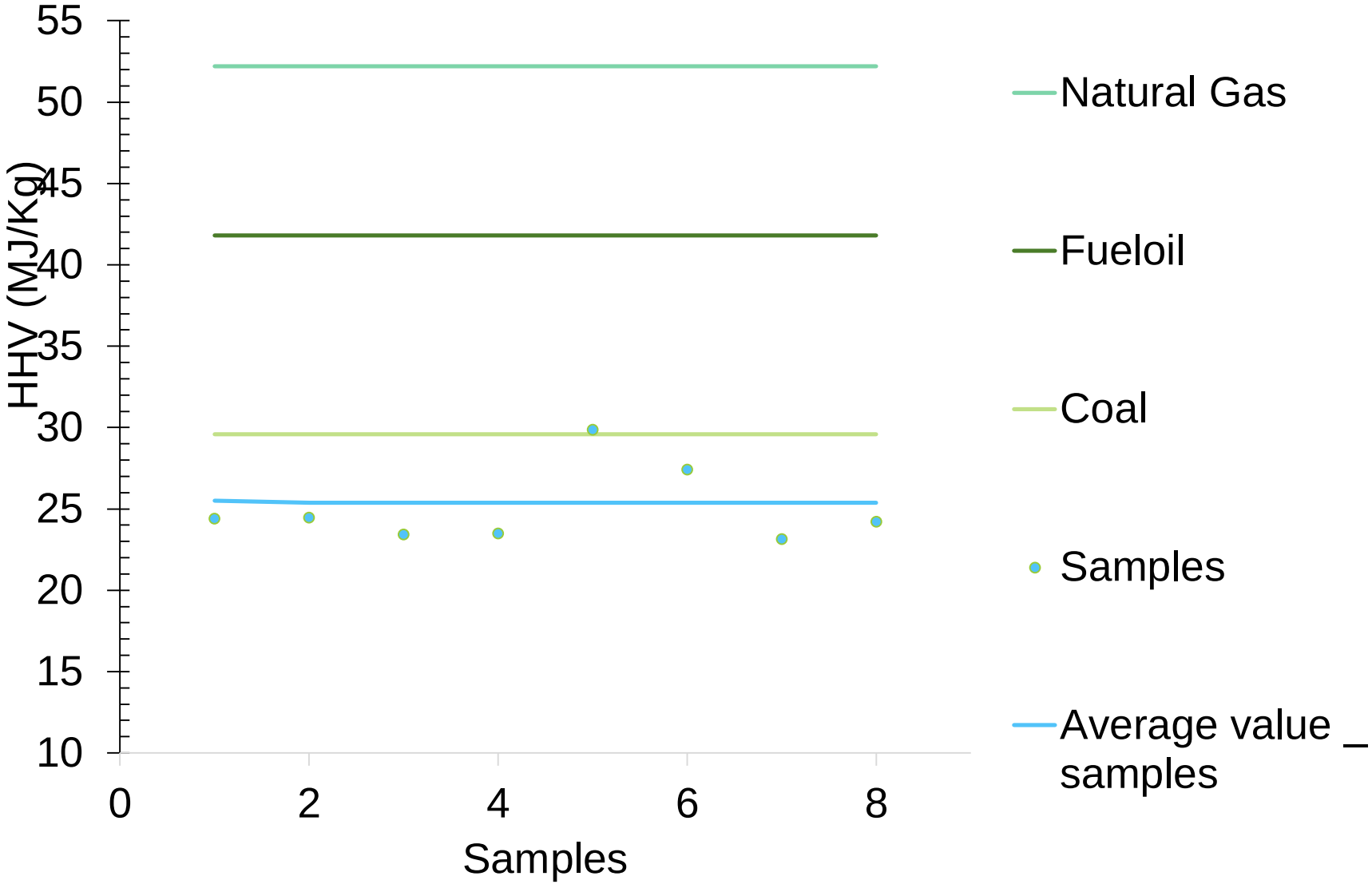
Heating value range between 23-30 MJ/Kg

Mix TW:UW - improve slightly the HHV of UW

RDF Pellets Characterization

Heating Value

Results



HHV is similar to coal

RDF Pellets Characterization

Results

Chlorine

	TW1	TW 2	TW 3	TW 4	TW 5	TW 6	UW	TW:UW (1:1)
Cl content (%, db)	0.41±0.07	0.31±0.01	0.29±0.05	0.07±0.001	0.17±0.03	0.98±0.01	0.78±0.07	0.52±0.03

Chlorine content < 1% => not expected to cause any significant technical or environmental problems

Technical parameter	Statistical average	Units	Classes				
			1	2	3	4	5
Chlorine content (Cl)	Average	% (dry mass)	≤ 0.2	≤ 0.6	≤ 1.0	≤ 1.5	≤ 3

Conclusion

- The textile wastes of automobile seats could be a basis for RDF production
- Their mix with rejected fractions from undifferentiated urban wastes will improve their energetic potential
- Promote the deviation of TW from landfills
- Promote the Circular Economy of sector

THANK YOU FOR YOUR ATTENTION!

ACKNOWLEGMENT

- **Instituto Politécnico de Viseu, the Center for Studies in Education, Technologies and Health (CI&DETS) and the Portuguese Foundation for Science and Technology (FCT), and**

- **Organization of the 9th International Conference - CORFU 2022**

beta@estgv.ipv.pt