20th UITIC
INTERNATIONAL TECHNICAL FOOTWEAR CONGRESS
Porto 2018
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FROM FASHION TO FACTORY
A New Technological Age

A sustainable solution for 23 billions pairs of used shoes ?

Régis LETY - CTC

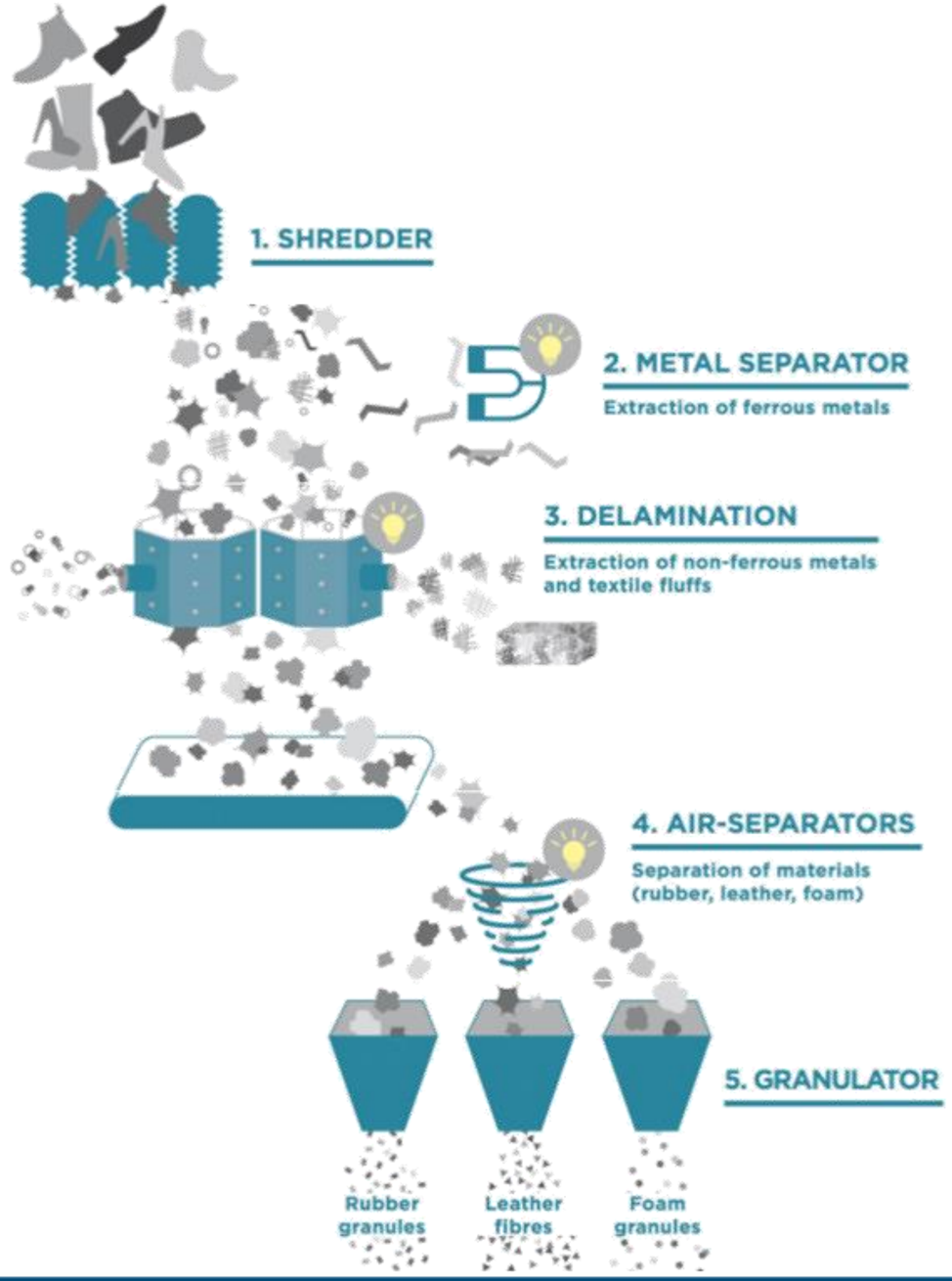
No sustainable way for the end of life of shoes today

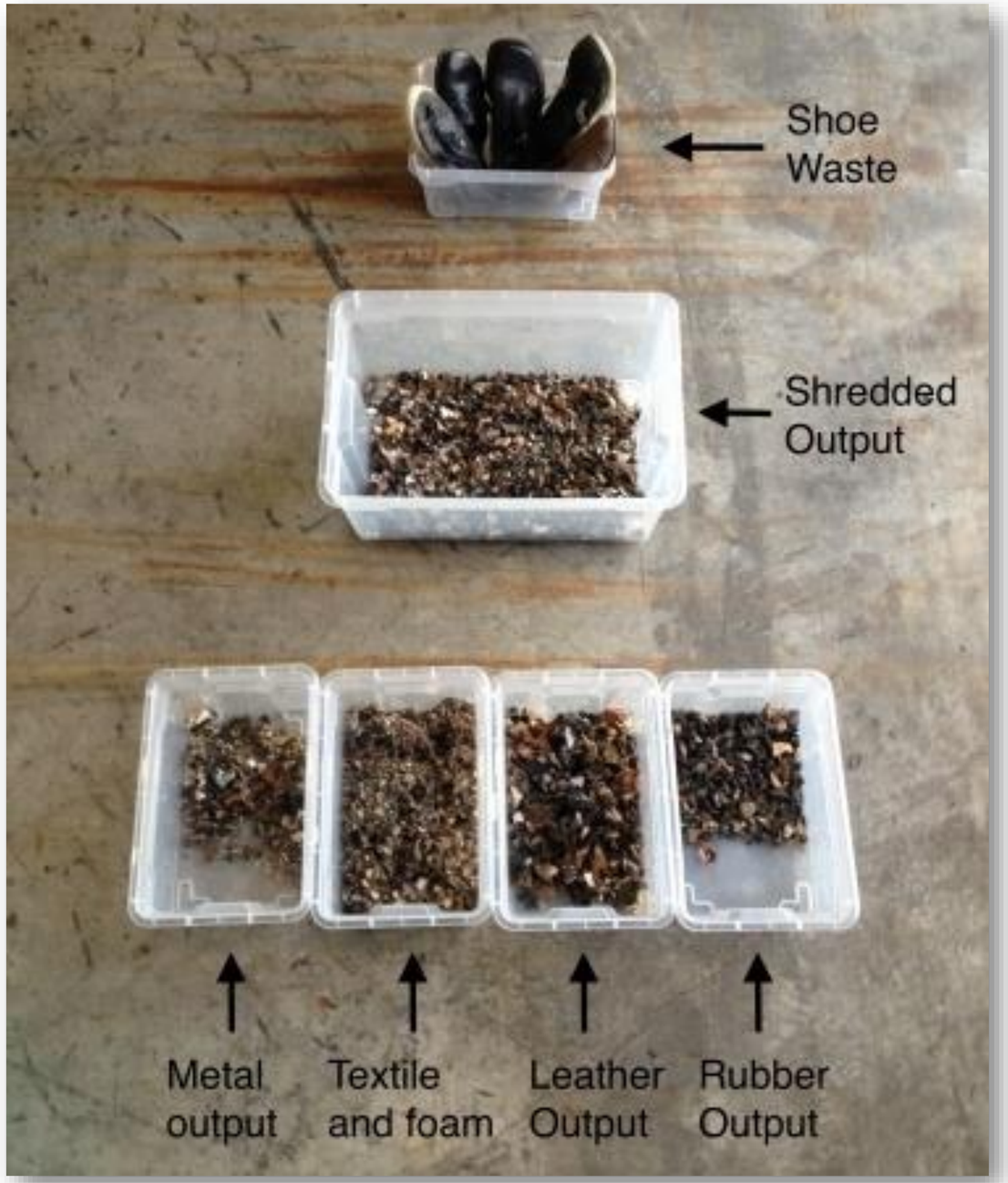
95%

247 000 t/year

How going from linear to circular economy in the footwear industry

The footwear recycling project





- **Materials' second life ?**

✓ Textile

✓ Metal

✓ Rubber

✗ Leather

Why Leather has problem today to find a second life as material ?

- **Heterogenous material, because of :**

  Species
  Way of tanning
  Way of finishing
  Hardness
  Thickness
  ….

« Thermicuir » project : thermal valorization of leather

- Why not using Leather as a combustible

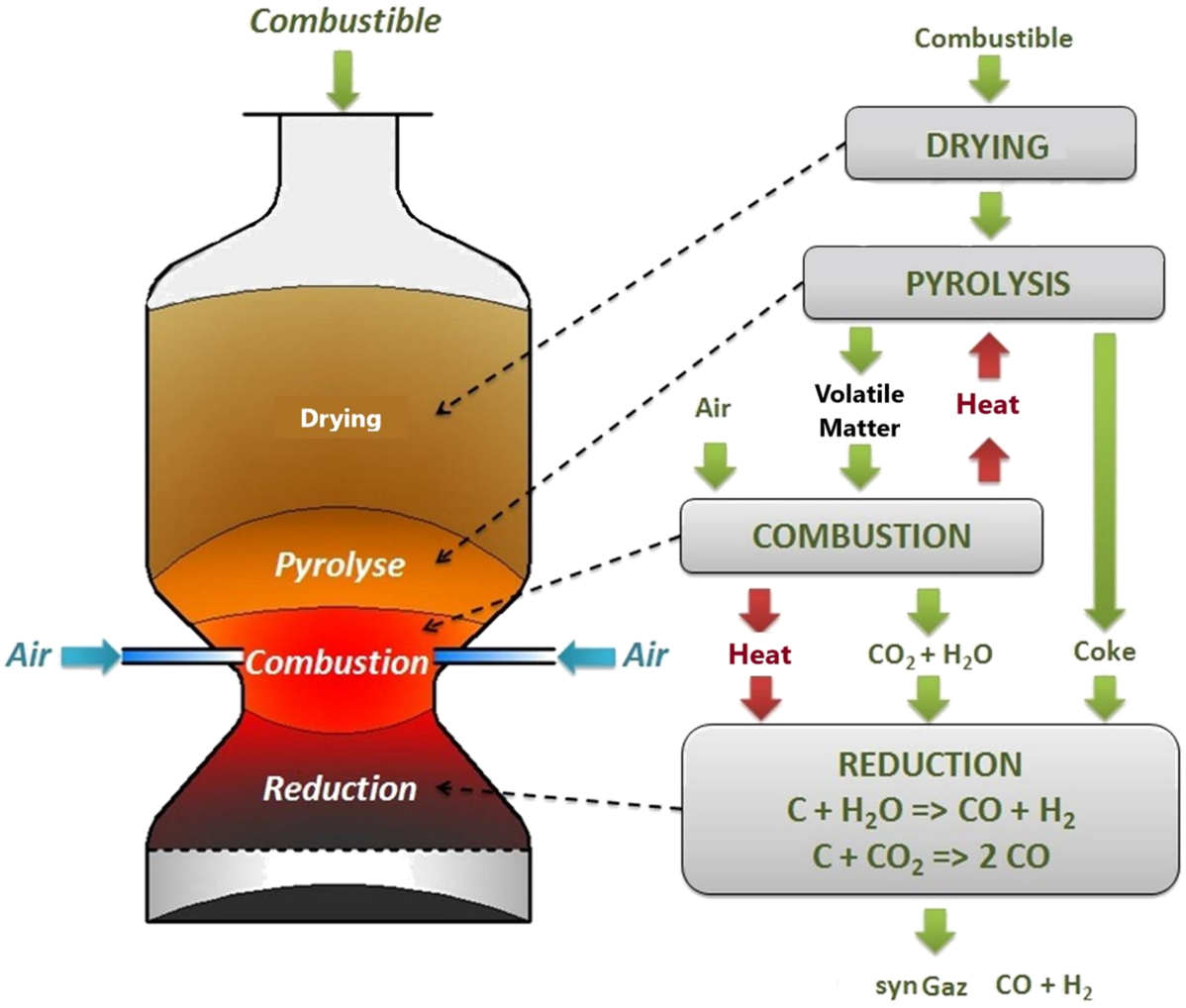
✓	✗
✓ High calorific power of leather ✓ Substitution to fossil fuels ✓ Reduction of CO_2 emissions	✓ Chromium 3 conversion to Chromium 6 in a classical incineration process

Gasification Vs Incineration

Slow degradation of matter

- Low Oxygen : avoiding chromium 6 appearance
- Better recovery of the calorific value of the waste
- Production of synthesis gas = new fuel
- Less smokes and pollution
- Compact installation (nominal power from 100 kW)

Gasification technology



Is leather compatible with this technology mainly developed for wood ?

- Energy balance ?
- Quality of the atmospheric emissions ?
- Chromium 3 behavior ?

Gasification tests

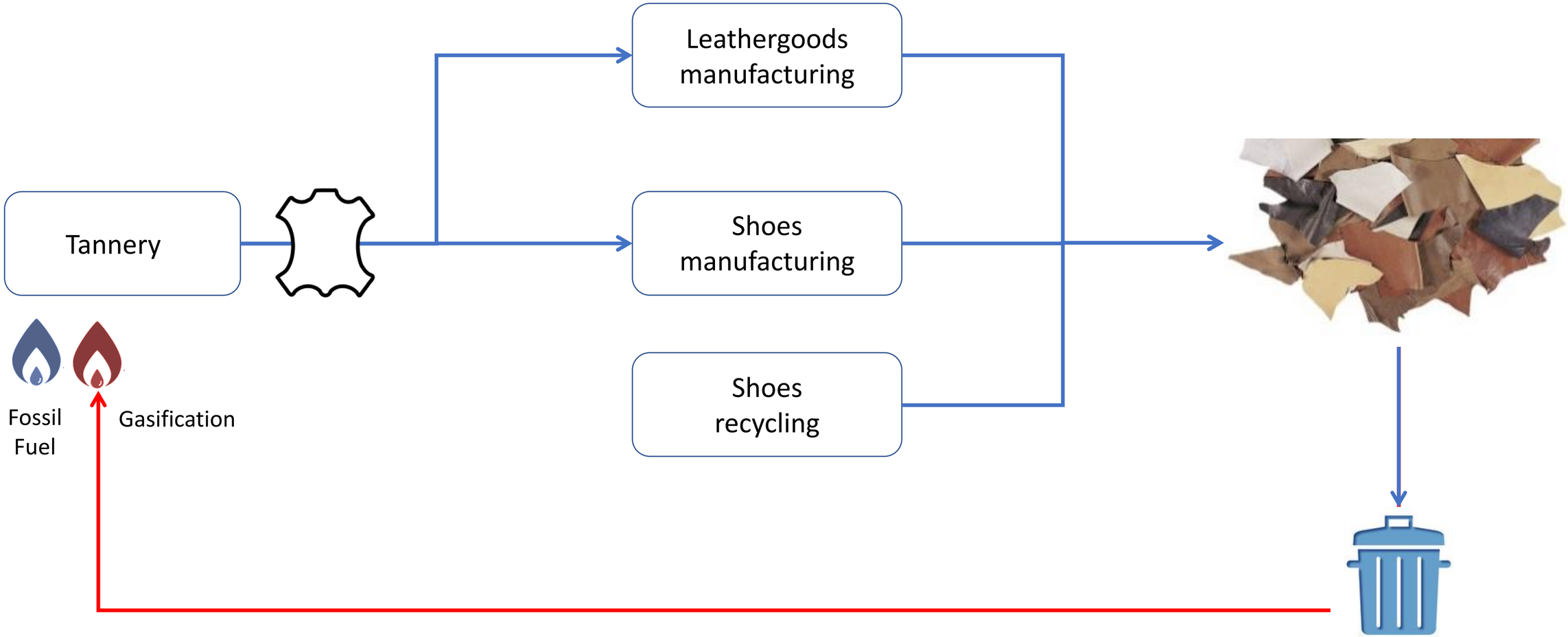
- Samples : Leather + wood (density) / Duration : 6 hours long
- Monitoring of the pollution / Measuring heat generated
- Focus on Chromium 3 behavior

Gasification tests – the results : sample 50% leather

- ✓ Process not disturb by leather
- ✓ Satisfaying energy balance
- ✓ Stability of Chromium 3

- ✓ Depolluting system needed for atmospheric emission (N, S, Cl)
- ✓ Density of the leather scrap

I have a dream…



I have a dream…

Some economical consideration : example of a medium tannery

- Annual energy bill for a consumption of 2 000 MWh of natural gas : **123 000 €**
  - 76 k€ of natural gas (38 €/MWh)
  - 47 k€ of Carbon Tax (470 t of CO2, 100 €/t in 2030)
- Using a gasification system with a combustible 50% wood/50% Leather : **26 000 €**
  - 520 tons of combustible : 260 t of Wood (21 k€) + 260 t of leather (5 k€/t)

Annual save from combustible conversion : **97 000 €**

- Estimated investment cost : **700 000 €**
- ROI : **7 years**

Conclusions

- Complementary solutions start to be available to fully manage the end of life of footwear :
  - ✓ Collecting network
  - ✓ Industrial technologies to dissassemble the shoes and sort the materials
  - ✓ Valorization as new materials (textile, polymers, metal)
- Leather valorization could be considered with gasification process, following speficic conditions
- Could gasification be the missing link to create a real circular economy scheme inside the leather sector ?


ctcp
Portuguese Footwear
Technological Centre


APICCAPS
Portuguese Footwear, Components and
Leather Goods Manufacturers' Association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