Screenings and grit production from Portuguese WWTP

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Minimize environmental impact

by-products are generated

• Screenings
• Grit
• Sludge’s
Screenings and grit

Wastes under the European List of Waste

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screenings</td>
<td>19 08 01</td>
</tr>
<tr>
<td>Grit</td>
<td>19 08 02</td>
</tr>
<tr>
<td>Sludge</td>
<td>19 08 05</td>
</tr>
</tbody>
</table>

Beirolas WWPT


AMB / Tinos 2015
Screenings and grit

Preliminary treatment

Grit removal

Screen equipment

Screenings

Grit
Final Disposal

Screenings

Grit

But it is necessary to pay for landfilling!

Landfill

What we do with these waste?
Waste management hierarchy

Screenings

Grit

What is recommended by the good environmental practices?

reuse

recycle

recovery

landfill

Directive nº 2008/98/CE
There are already some solution!

- **Screenings** - biological treatment by composting or anaerobic digestion
- **Grit** - valorised through their use in construction
To implement an adequate treatment it is important to know the quantity and quality of waste.

The best way to predict the amount of waste is taking into account the historical WWPT data.
Some facts!

Portugal

A significant growth in municipal WWT
Some facts!

There are a significant number of WWPT - 2,536 WWPT with different dimensions and configurations.

E.g. SIMTEJO - WWTP ranges from 80 to 140,000 m$^3$d$^{-1}$

There are 283 ME

The available data is sparse and spread over many sources.
Methodology

• Financial statements and other legal reports of Portuguese ME

• **Specific surveys** sent to 20 ME
  • Served population
  • Wastewater flow treated
  • Screenings and grit productions
Portugal

Screenings and grit

13 answers - but only 8 of ME
Population served by WWT - 62%.

Águas de Santo André, Águas de Trás-os-Montes e Alto Douro, Águas de Zêzere e Côa, Águas do Algarve, Águas do Noroeste, Águas do Oeste, Águas do Sado, SANEST, SIMARSUL, SIMDOURO, SIMRIA, SIMTEJO, SMAS Caldas da Rainha.

2013
Population - 5,832,830
Flow - 439,555,000 m$^3$
Screenings and grit

2013
Population - 5,832,830
Flow - 439,555,000 m³

Screening - 5,659 ton
Grit - 7,869 ton

Population - 5,832,830
Flow - 439,555,000 m³
Per capita values

Grit
Screenings
WW (grit)
WW (screenings)

Wastes per capita values (g.inhab\(^{-1}.d\(^{-1}\))

Wastewater per capita values (L.inhab\(^{-1}.d\(^{-1}\))

Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Grit</th>
<th>Screenings</th>
<th>WW (grit)</th>
<th>WW (screenings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td></td>
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<td>2010</td>
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<td>2012</td>
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<td>2013</td>
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</tbody>
</table>
Screenings and grit

Portugal, 2013
Productions may be estimated
The screenings - 8,495 ton
The screenings and grit - 12,256 ton

The amount of screenings and grit depend:
• WWTP number,
• Treatment technologies,
• Lifestyle,
• The sewer systems
Per capita value

Grit

Screening

Grit per capita values (g.inhab\(^{-1}\).d\(^{-1}\))

Screenings per capita values (g.inhab\(^{-1}\).d\(^{-1}\))

ME 1  ME 2  ME 3  ME 4  ME 5  ME 6  ME 7

ME 1  ME 2  ME 3  ME 4  ME 5  ME 6  ME 7

AMB / Tinos 2015
Screenings and grit

Waste produce in 2013

• per capita values of each ME
  Screenings - 5,189 - 11,987 ton
  Grit - 7,353 - 26,734 ton

• per capita values of an average of 13 ME
  Screenings - 8,495 ton
  Grit - 12,256 ton
# SIMTEJO

<table>
<thead>
<tr>
<th></th>
<th>Alcântara</th>
<th>Beirolas</th>
<th>Chelas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Population</strong>&lt;br&gt;Pep</td>
<td>756,000</td>
<td>213,500</td>
<td>211,000</td>
</tr>
<tr>
<td><strong>Population (2012)</strong>&lt;br&gt;Pep</td>
<td>531,146</td>
<td>177,207</td>
<td>139,349</td>
</tr>
<tr>
<td><strong>Project flow</strong>&lt;br&gt;(m³.d⁻¹)</td>
<td>140,000</td>
<td>54,500</td>
<td>52,500</td>
</tr>
<tr>
<td><strong>Flow (m³) (2013)</strong></td>
<td>53,708,041</td>
<td>16,971,070</td>
<td>14,177,553</td>
</tr>
<tr>
<td><strong>Screenings removal</strong></td>
<td>remove solids &gt; 6 mm</td>
<td>remove solids &gt; 6 mm</td>
<td>remove solids &gt; 6 mm</td>
</tr>
<tr>
<td><strong>Grit removal</strong></td>
<td>Aerated grit and grease removal</td>
<td>Aerated grit and grease removal</td>
<td>Aerated grit and grease removal</td>
</tr>
<tr>
<td><strong>Final disposal</strong></td>
<td>Landfilling</td>
<td>Landfilling</td>
<td>Landfilling</td>
</tr>
</tbody>
</table>
SIMTEJO
Screenings and grit

**Flow (million m$^3$.year$^{-1}$)**

- **Population (thousand inhab)**

**Population (thousand inhab)**


**Screenings and Grit**


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SIMTEJO
Screenings and grit

**Screenings**

- Alcântara
- Beirolas
- Chelas

**Grit**

- Alcântara
- Beirolas
- Chelas

Wastes removal equipment was identical but different per capita wastes productions.
Precipitation in Lisbon

- Alcântara
- Beirolas
- Chelas
- Precipitation

Year

WW per capita (L.d⁻¹.inab⁻¹)

Precipitation (mm)

2007 2008 2009 2010 2011 2012 2013

Flow (thousand m³.month⁻¹)

2010

Precipitation (mm)

Jan  Feb  Mar  Abr  May  Jun  Jul  Aug  Set  Out  Nov  Dez

Flow (thousand m³.month⁻¹)
Precipitation in Lisbon

The diagram shows the precipitation in Lisbon for different months. The precipitation is measured in millimeters (mm) and is categorized by different locations: Alcântara, Beirolas, and Chelas. The graph also includes a line indicating the Precipitation.

The vertical axis on the left represents the Grit (ton), ranging from 0 to 400, while the vertical axis on the right represents the Precipitation (mm), ranging from 0 to 120. The horizontal axis represents the months of the year.

The data shows a significant variation in precipitation throughout the year, with some months experiencing higher precipitation than others.
Screening and grit disposal

• Data collected from the surveys demonstrate that most of the wastes are sent to landfill.
• The estimated cost of landfilling (2013) were:
  • screenings ≈ 272,000 €
  • grit ≈ 392,000 €
• It can mean an immediate saving of about 0.2% in WWT costs by cubic meter
The screenings and grit valorisation has many environmental and economic advantages:

- Reduction the associated costs with screening and grit final disposal;
- Reducing the amount of waste sent to landfill, complying with legal guidelines;
- Reducing the amount of extracted aggregates, promotes the sustainable use of resources;
Conclusion

✓ Estimate values of wastes production from WWPT was **difficult to predict**

✓ Production in Portugal:
  - 5,189 - 11,987 ton to screenings
  - 7,353 - 26,734 ton to grit

✓ The current final disposal of screenings and grit in Portugal is **landfills**.
  - it is possible to value and reuse screenings and grit
  - it is necessary to invest in training and environmental awareness campaigns
Acknowledgements

We thank to the several wastewater entities in providing the screenings and grit productions data.

And

Would like to thank all of you for your kindly attention – thank you 😊