RAWFILL

KICK OFF EVENT

Liège, 7th JUNE 2017

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Renaud DE RIJDT - Atrasol
PROJECT CONTEXT
PROJECT SUMMARY
PARTNERS & ASSOCIATED PARTNERS
WHAT IS AND WHY DOING LFM?
DEVELOPING A NEW EUROPEAN (WORLDWIDE) MARKET
SOME RELATED PROJECTS
MILESTONES, LONG TERM EFFECTS & TARGET GROUPS
EXPECTED RESULTS
WP DESCRIPTION
PLANNING
FUTURE EVENTS
WE NEED YOU!
DO YOU KNOW THAT:

- There are ~100 000 landfills in NWE?
- NWE has an huge need of
  - Raw materials
  - Energy sources
  - Land
- There must be something to do about that: RAWFILL
RAWFILL WILL DEMONSTRATE

1. That the valuable LFs materials potential is huge
2. That it can be measured with (very) reasonable costs by using modern geophysics survey
3. That related LFM data can be hosted in a common landfill Enhanced Inventory Structure
4. That the interest of a LF for a LFM project can be evaluated through a Decision Support Tool
EP votes YES to add ELFM to Landfill Directive

Breaking News: European Parliament votes YES to include “Enhanced Landfill Mining” in the EU Landfill Directive

On 14-3-2007 the European Parliament voted about its position with respect to EU Waste Policy. The so-called “Waste Package” concerns four Directives, incl. the Landfill Directive. For the first time, this Landfill Directive is now to endorse “Enhanced Landfill Mining”.

On March 14, 2017, the European Parliament voted about its position with respect to the on-going revision of EU Waste Policy. The so-called “Waste Package”, which concerns a whole list of measures as regards packaging, recycling, landfill and electronic waste, has now been formally accepted by the European Parliament (EP). The agreed “Waste Package” concerns the adaptation of four EU Directives, including the Landfill Directive. This Directive (1999/31/EC) regulates waste management of landfills in the European Union. Its overall aim is “to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste, during the whole life-cycle of the landfill”.

# RAWFILL ID CARD & BUDGET

<table>
<thead>
<tr>
<th>Project title</th>
<th>Supporting a new circular economy for RAW materials recovered from landFILLS</th>
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<tbody>
<tr>
<td>Project acronym</td>
<td>RAWFILL</td>
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<tr>
<td>Name of the Lead partner organisation in English</td>
<td>SPAQuE</td>
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<td>Project duration in months</td>
<td>36 months</td>
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<tr>
<td>Programme priority</td>
<td>Priority Axis 3 Resource and materials efficiency</td>
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<tr>
<td>Programme priority specific objective</td>
<td>SOS: To optimise (re)use of material and natural resources in NWE</td>
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<tr>
<td>Total budget ERDF</td>
<td>2 289 575.11</td>
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</table>
| Total budget                                                      | 3 815 958.54
RAWFILL SUMMARY

RAWFILL provides to stakeholders within all NWE:

✓ a common landfills inventory framework
✓ a decision support tool
✓ an innovative combination of survey methods

RAWFILL demonstrates in real conditions:

➢ a global landfill sites survey & selection method
➢ based on combination of existing knowledges
➢ at reasonable costs
➢ in order to mine resources.

Beneficiaries are NWE public & private landfills owners and stakeholders who want to implement technically and economically feasible profitable resource-recovery driven Landfill Mining projects.
RAWFILL
WORKPACKAGES

WP M Project management

WP Investment
WP I1
WP I2

WP T1 Enhanced Inventories Framework

WP T3 – Demonstration RAWFILL methodology

WP LT (LT effects)

WP C Communication

WP T2 DST

LFM projects:
- Geophysics
- Excavation
- LF mining

- Conceptual model
- Use Inventory framework
- Proof DST level 1
- Proof DST level 2
- Communication: site visit

- Desk studies
- Authorizations
- Site survey
- Drilling
- Analysis

- DST level 1
- DST level 2
ASSOCIATED PARTNERS:
Public bodies, Private companies, NGOs, etc.

• Go4Circle (Be), Rijkwaterstaat (NL),
• Provincie Noord-Brabant (NL),
• Danish Waste Solutions (DK),
• ASTEE (Fr),
• BRGM (Fr),
• Allied Associates Geophysical (D),
• AIVE (Wal), Seco (Be),
• KUL (Be), University of Vienna (A),
• Direction de la Politique des Déchets (Wal),
• Suez, Wanty, Ballast Nedam, JM Recycling, Shanks, DC Environment, Opale Environnement (Fr), Enveco (Gr), Tellum (Be), Vertase (UK), …

Other stakeholders are welcome…
(Enhanced) Landfill Mining is defined as

- the safe exploration, conditioning, excavation and integrated valorization of historic, present and/or future landfilled waste streams:
  - as materials
  - as energy
- using (innovative) transformation technologies
- respecting the most stringent social and ecological criteria.

» EURELCO DEFINITION
www.eurelco.org
W2x: What to do With the Waste?

**Waste to Energy (W2E):** the production of energy in the form of electricity or heat from landfill gas resulting from the decomposition of organic material or from the dump material, where the waste is converted into fuel through heating.

**Waste to Material (W2M):** the valorisation of the waste streams that are released from a landfill and the reuse of the waste streams as materials.

**Waste to Land (W2L):** the creation of space at the location of the landfill site and the assigning of a new land use to the landfill site.
CURRENT CONTEXT

•~100 000 landfills in NWE
  ➢ Most of them are not controlled landfills (local pollution, land-use restrictions, global impacts as climate change impacts, health effects…)
•NWE has an huge need of:
  ➢ Raw materials
  ➢ Energy sources
  ➢ Land
NEED FOR RAW MATERIALS?

EU Primary aluminium import dependency

Aluminium in tonnes per year

- 51%
- 35%
- 14%

Primary production
Total recycling
Net-imports

Year:
NEED FOR LAND?

**Graph:**

*Évolution du prix des terres agricoles entre 1990 et 2010*

Source: Terres d’Europe/Scaf, d’après Safer, Eurostat et données nationales.
RAWFILL - RAW materials from landFILLs

Schéma de l'Économie Circulaire

Nutriments Biologiques

Nutriments Techniques

Interreg
North-West Europe
European Regional Development Fund

AGRICULTURE, ARBORICULTURE, ÉLEVAGE, AQUACULTURE, CHASSE & PÊCHE

EXTRACTION MINIÈRE
FABRICATION DE MATÉRIAUX

MATERIAUX

ÉCOLOGIES

FABRICATION (COMPOSÉS ÉLÉMENTS)

ASSEMBLAGE (UNITÉS)

DISTRIBUTION (VENTE OU SERVICES)

RECYCLAGE

RECONDITIONNEMENT/REUSINAGE

REDISTRIBUTION REEMPLOI/ MUTUALISATION

MAINTENANCE PRÉVENTIVE/ CURATIVE

MÉTAMAGIST RÉSEPTEURS

MÉTAMAGIST COMPOSÉS BIOCHIMIQUES

CONSEILIVE, PRODUIT, SERVICE

CASCADES

CÉRÉALES, LIGNIÈRE

MÉNAGE

EXTRACTION DE COMPOSÉS BIOCHIMIQUES (après énergie-

d'ordre, second traitement)

MÉTAMAGIST COMPOSÉS BIOCHIMIQUES

COLLECTE/TRI

COLLECTE/TRI

RÉCUPÉRATION D'ÉNERGIE

ENQUISSEMENT

RÉCUPÉRATION D'ÉNERGIE

A MINIMISER ET OPTIMISER

(Graphique adapté de la Fondation Ellen MacArthur par l'Institut de l’Économie Circulaire et la chaire “business et éthique” de Kedge Business School)
WHY EU SUPPORTS RAWFILL?

LFM market is emergent but does not yet develop at industrial level
WHY GIVING EU MONEY TO RAWFILL?

- LFM market is emergent:
  - A lot of experiences and pilot projects
    - LFM
    - ELFM
WHY EU SUPPORTS RAWFILL?

LFM does not yet develop at industrial level (1):

EXTERNAL FACTOR

• Lack of profitability due to current low materials prices
• (even if their productions still increase)

- but this will not last forever -
Prix réel de l'aluminium primaire, $US constants de 1982 pour une tonne métrique, 1927 à 2006

Sources : US Geological Survey (Prix nominal); US Bureau of Labor Statistics (Indice de prix à la production, Métaux et produits métalliques); Traitement : CRDT-UQAC
LFM does not yet develop at industrial level (2):

**INTERNAL FACTORS**

- Lack of reliable and affordable data to evaluate the resources landfill potential (raw materials and energy)
- Lack of suitable legislations allowing to mine landfills
- Administrative barriers

= Risky business
So that:

No suitable decision can be taken on the most relevant projects to be launched first
WHY GIVING EU MONEY TO RAWFILL?

LFM MARKET IS EMERGENT

AND THIS MARKET IS HUGE
RAWFILL delivers a EIF, a cost-effective characterization method and a Decision Support Tool (DST) to prioritize LFs for resource-recovery driven LFM projects.

- EIF & DST are implemented by 25 LF owners/managers in the NWE regions.
- LF Geophysics method has been demonstrated on 2 sites.
- At least 175 tons of materials are recovered.
- 2 Topics groups are established within EURELCO; electronic library is on line and training courses are available in academic & extracurricular education centres in NWE.
LONG TERM EFFECTS

- EU wide knowledge exchange platform / Eurelco
- EU LFM policy platform/ Eurelco Network
- Electronic platform
- Education & training in LFM / Ulg Geophysics Training Module
TARGET GROUPS

• Local, Regional & National public authorities
• Entreprises: SMEs & large entreprises
  (civil engineering, LFs operators, recycling industry, investors, consultancy companies, geophysics companies....)
• Waste management Agencies
• Education & Research
• NGOs
• International organisations
•...
Expected results by 2025

✓ EIF & DST fully implemented in Partners’ regions and endorsed in all other NWE regions.
✓ 500 LFs selected for LF Geophysics,
✓ 100 LFs fully characterised,
✓ 20 first LFM projects launched,
✓ 5,250 kton materials (metal, etc.) recovered
✓ 525 jobs created.
Expected results by 2030

- 2,500 promising LFs selected for LF Geophysics,
- 500 landfills fully characterised.
- 60 LFM projects launched.
- 15,000 kton materials (metal, etc.) recovered
- 1,500 jobs created
- 250 enterprises supported to introduce new-to-the-firm products.
RAWFILL CONCEPT

WP M Project management

WP T1 Enhanced Inventories Framework

WP I, I2 – LF Geophysics

WP T2 DST

WP T3 – Demonstration of RAWFILL methodology

 RAWFILL Infographics: links between WPs & Demonstration Phase

WP C Communication

WP Long Term Effects
An Enhanced Inventory is an inventory of landfills containing suitable information about the landfills content allowing to perform LFM projects after prioritisation with DST.
The Decision Support Tool is a 2-levels multicriteria analysis system. Used to evaluate LF sites and LFM projects.

4 large sectors:

- Environmental impacts
- Social/societal impacts
- Technological
- Economical
**Interreg North-West Europe**

**RAWFILL**

**European Regional Development Fund**

**HOW IT WILL WORK**

1. **Use RAWFILL Inventory framework**

2. **5 000 LFS**

3. **DST LEVEL 1 Filter**
   - Quick scan
   - Screen/Eliminate

4. **500 LFS**

5. **DST LEVEL 2 Priorise**
   - Rank
   - Classify

6. **X PROJECTS**

- Eliminate all sites where obviously no interest for LFM at this time
- Not enough Data to use DST
- Enough Data to use DST
- GEOPHYSICS
- Eliminate

**NB:** DST + geophysics can be used also to rank + survey a single LF when classification limits will be fixed.
To launch LFM projects based on realistic business plans, it is essential to evaluate the resource content of the LFs by using reliable and cost effective combinations of on-site characterization methods for delivering a Resource Distribution Model (RDM).

2 WP address this problem by providing a dedicated LF geophysics survey methodology:
- Landfill 1 IOK (Flanders)
- Landfill 2 SAS Les Champs Jouault (France)
WP DEMONSTRATION

- Demonstrate the added value of RAWFILL methodology for measuring the economic mining potential of LFs
- Showcase its performance in real conditions, when actually implemented on 2 selected pilot sites.
- Demonstrate efficiency and added value of EIF & DST tools
- Demonstration of performance & value-for-money of geophysics survey for resource-oriented LF characterisation
MAIN LINKS BETWEEN WPs

**RAWFILL**
European Regional Development Fund

Tells what suitable fields (« survey fields ») to place in framework (LF volume, LF height, water, ‘metal content’, etc.)

« rich » site
« poor » site

WP Investment
WP I 1
WP I 2

Gives survey results to develop conceptual model

WP T1 Enhanced Inventories Framework

WP T3 – Demonstration RAWFILL methodology

WP T2 DST
• DST level 1
• DST level 2

Use framework for the 2 demonstration sites
Adapt framework if needed

Use DST for the 2 demonstration sites
Calibrate DST if needed

Tell what weight, accuracy, etc. to give to the survey fields
<table>
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<tr>
<th>WP 1: Long-term Implementation</th>
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<tbody>
<tr>
<td><strong>A.1.1</strong> Stimulation EU-wide exchange of knowledge and practices by setting up an EU-wide knowledge exchange platform and supporting organisations providing education &amp; training in UXIs after the end of the project</td>
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<tr>
<td><strong>A.1.2</strong> Creation of an electronic platform &amp; database</td>
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<tr>
<th>WP 1.1.1: Enhanced Inventory Framework (E.I.) compliant</th>
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<tr>
<td><strong>A.1.2.1</strong> Analysis of current UXIs inventory structures within NWE regions</td>
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<tr>
<td><strong>A.1.2.2</strong> Benchmarking of existing UXIs structures</td>
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<tr>
<td><strong>A.1.2.3</strong> SHOT analysis of UXIs characterization methods</td>
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<tr>
<th>WP 1.2: Decision Support Tool (DST) for UXI projects</th>
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<tr>
<td><strong>A.1.2.1</strong> Setting up the DST software &amp; building a list of relevant indicators related to UXIs projects</td>
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<tr>
<td><strong>A.1.2.2</strong> Design of multi-criteria analysis tool (MCA)</td>
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<td><strong>A.1.2.3</strong> Weighting of selected indicators</td>
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<tr>
<th>WP 1.3: Demonstration of UXI resource potential &amp; benefits</th>
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<tr>
<td><strong>A.1.3.1</strong> Case studies of UXIs for specific UXIs and UXI use in order to demonstrate</td>
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<td><strong>A.1.3.2</strong> Financial and economic viability of UXIs in the context of UXIs</td>
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<td><strong>A.1.3.3</strong> Summary of lessons learned and recommendations</td>
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<tr>
<td><strong>A.2.1</strong> Information collection and surveying</td>
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<td><strong>A.2.2</strong> Geophysical survey on site</td>
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<tr>
<td><strong>A.2.3</strong> Geophysical survey on site</td>
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<th>WP 2: Risk and Landfill 2: France, France, France, France, France</th>
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<tr>
<td><strong>A.2.1</strong> Information collection and surveying</td>
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<th>WP 3: Communication (Communication)</th>
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<tr>
<td><strong>A.3.1</strong> Setting up a UXI strategy</td>
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<td><strong>A.3.2</strong> Publication</td>
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<td><strong>A.3.3</strong> Media strategy</td>
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<td><strong>A.3.4</strong> Technical expertise</td>
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<tr>
<td><strong>A.3.5</strong> Digital expertise</td>
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<td><strong>A.4.2</strong> Publication</td>
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<tr>
<td><strong>A.4.3</strong> Media strategy</td>
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<tr>
<td><strong>A.4.4</strong> Technical expertise</td>
</tr>
<tr>
<td><strong>A.4.5</strong> Digital expertise</td>
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EVENTS

Please save these dates!

• Kick-off Meeting: Today!
• 1st Advisory Board: 2017, October
• Mid-term Event: 2019, March
• 2nd AB: 2019, March
• Final Event: 2019, December
• 3rd AB: 2019, December
Interreg North-West Europe

INVENTORIES STRUCTURES
- LFM DATA
- CHARACTERISATION METHODS DATA
- BECOME A RAWFILL SUPPORTER

BECOME LF MINERS

Come and see us after the presentation!
Thank you!

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Thank you!