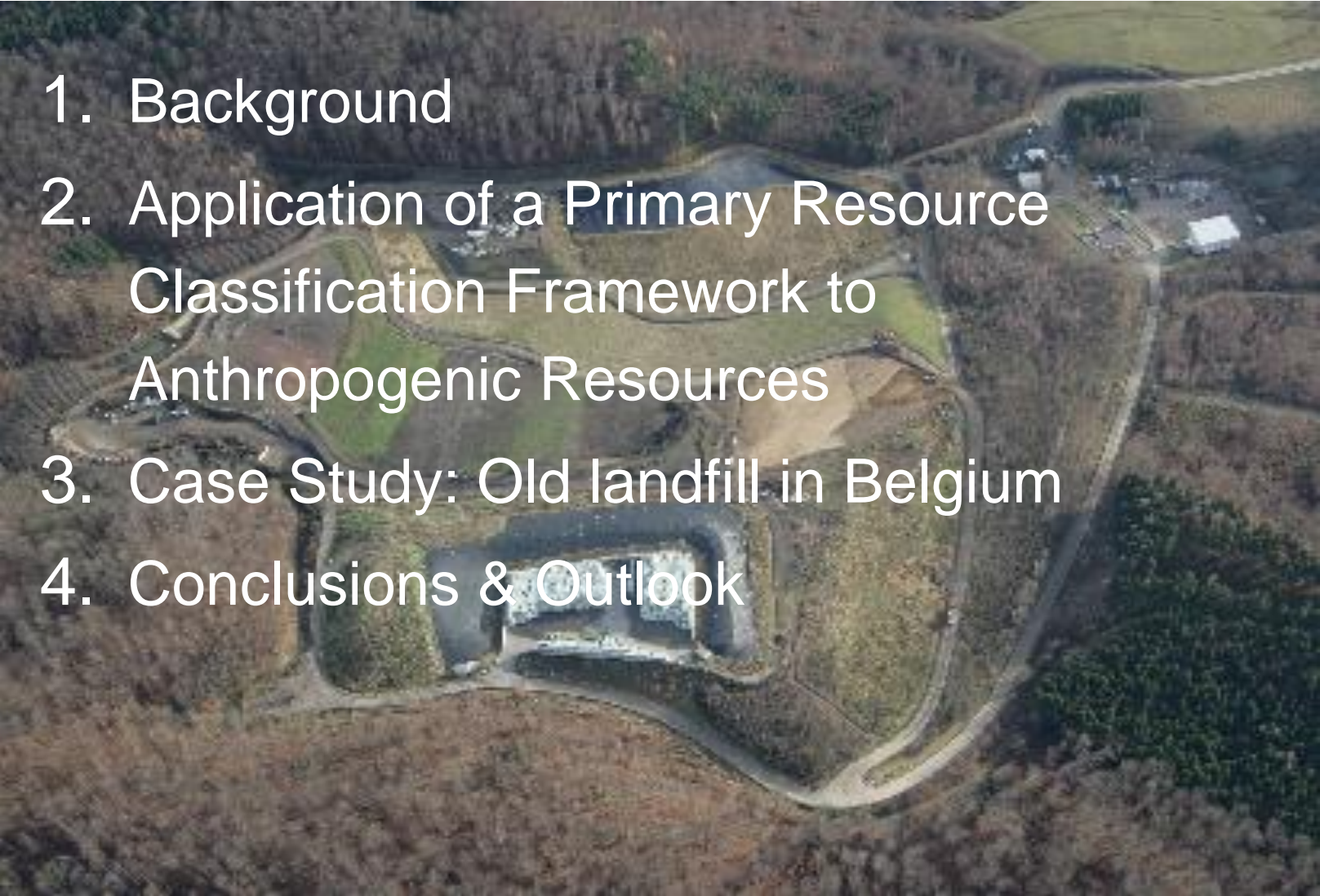


# Evaluating and Classifying Resources from Old Landfills: A New Methodology

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1. Background
  2. Application of a Primary Resource Classification Framework to Anthropogenic Resources
  3. Case Study: Old landfill in Belgium
  4. Conclusions & Outlook

# 1. Background

## Resource Classification & Reporting is

- Established for minerals in the geosphere, fossil fuels & renewable energy
- Missing for anthropogenic resources



## Systematic & transparent methodology is needed for

- Integrated assessment of resource availability
- Prioritize resource extraction projects
- Information for decisions makers in waste management
- Feedback on design for recycling

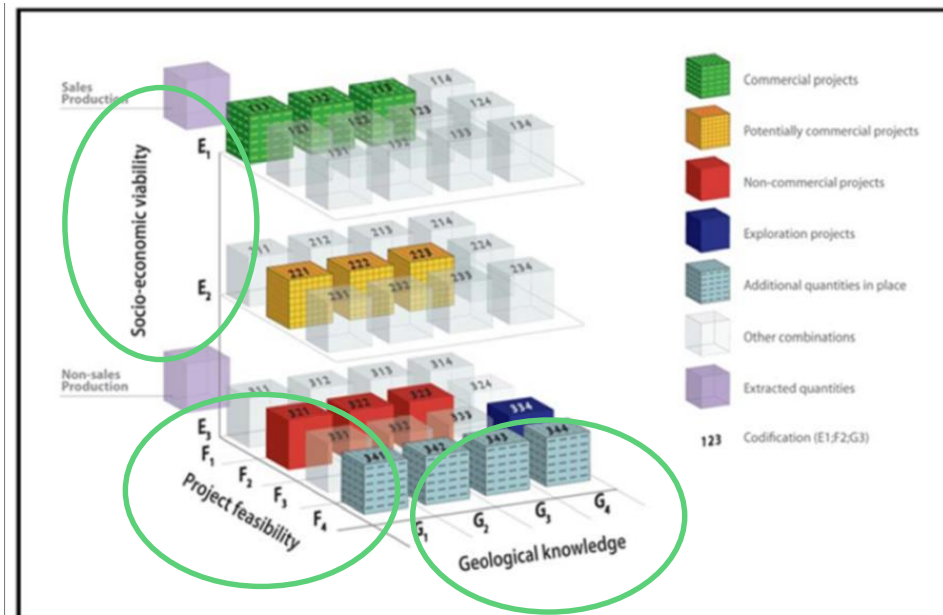
## Goal:

**Develop a methodology to integrate anthropogenic resources into primary resource classification frameworks**

## **2. Application of UNFC-2009 to Anthropogenic Resources**

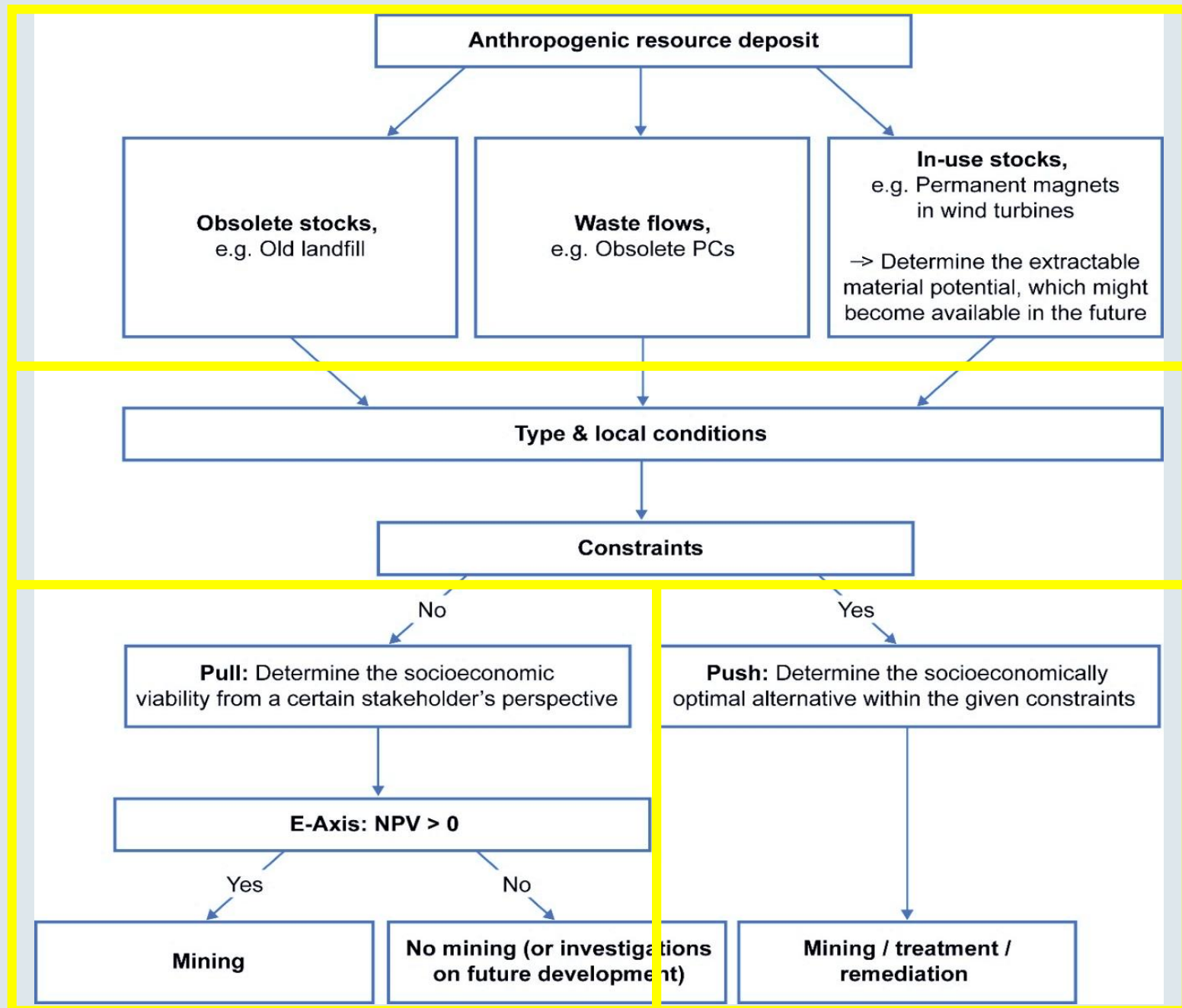
# 4. Resource Classification under UNFC-2009

Resource Classification Phases	UNFC-2009 Axes	Goal
Prospection	(Preconditions)	Selection of deposit & resource potential
Exploration	G-Axis	Knowledge on composition & recoverable quantities
	F-Axis	Technical feasibility & project status
Evaluation	E-Axis	Socioeconomic viability



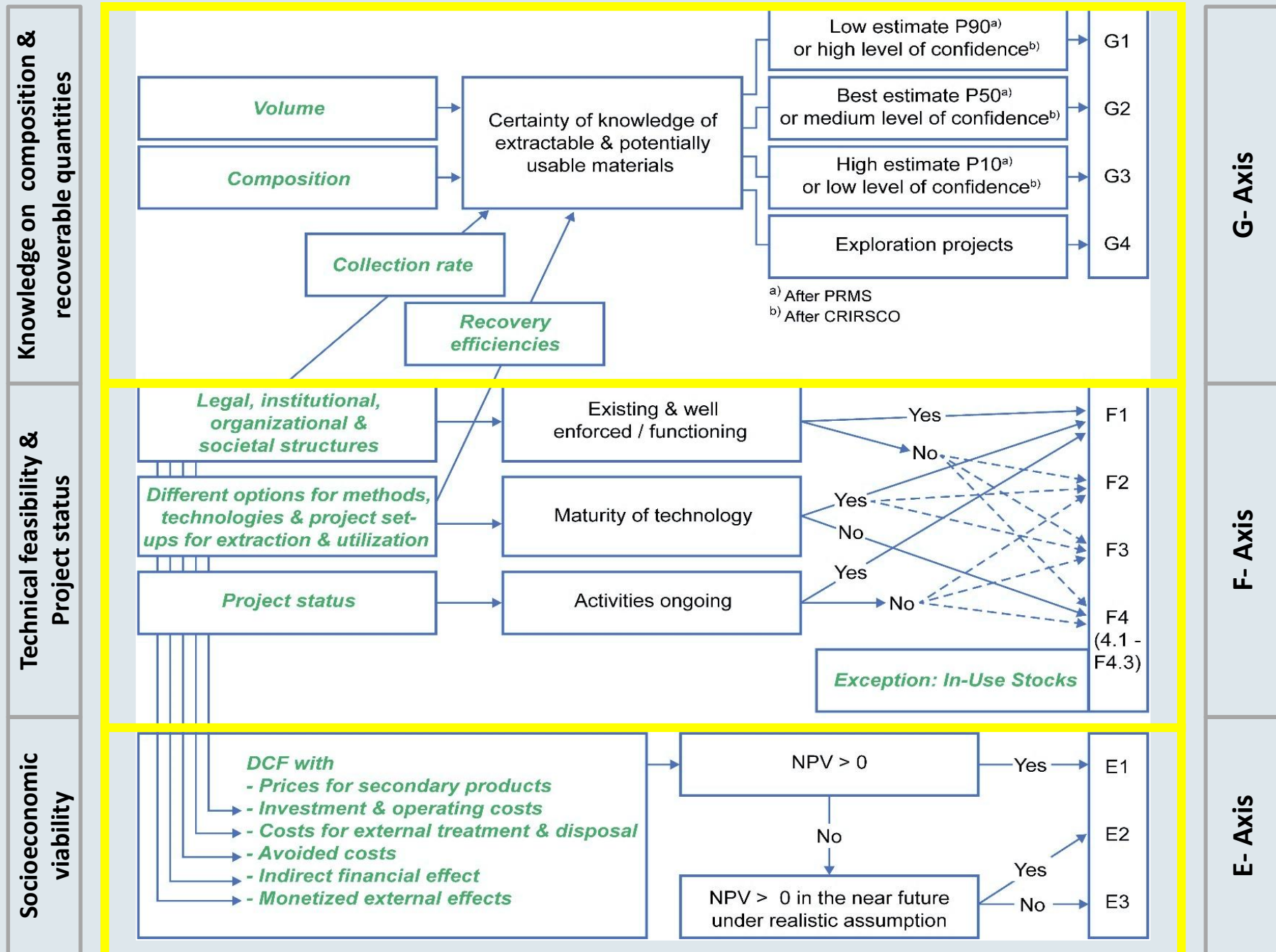
UNECE, 2010

## 4. Decision Guidelines for Anthropogenic Resources I





## 4. Decision Guidelines for Anthropogenic Resources II



### **3. Case Study: Application of UNFC-2009 to an Old Landfill in Belgium**

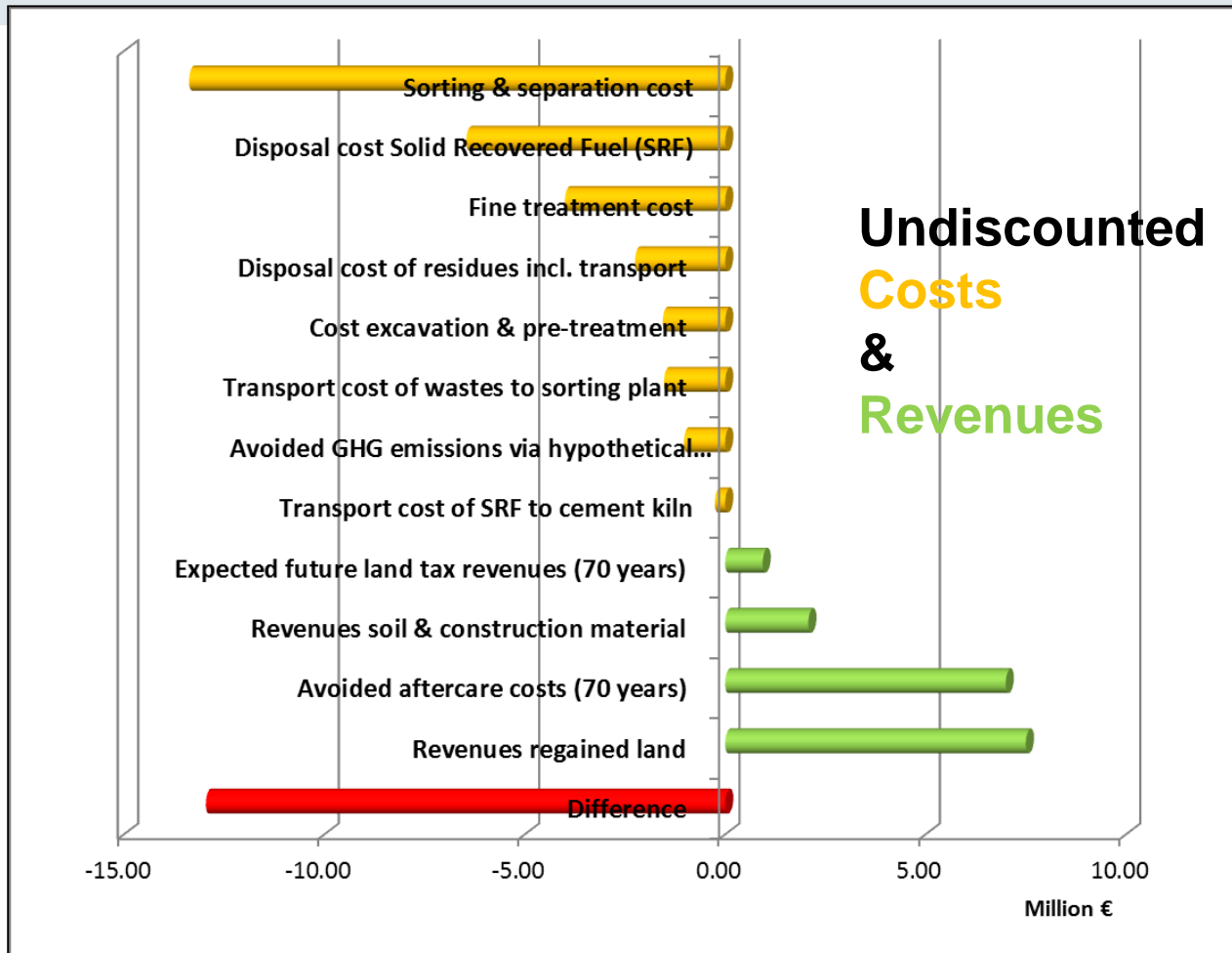


- 390,000 t of mainly municipal solid waste (MSW)
- Active landfill: 1947 – late 1970s (closed)
- Area of 50,000 m<sup>2</sup>
- Partially covered with a clay cover, no remediation need
- Assume landfill to be excavated within 1 year, with operations starting in 2017.
- Evaluation perspective: Public
- Share of metals very low, not recovered
- Fine fraction sold as construction material
- Plastics & wood turned into Solid Recovered Fuel (SRF) used in cement kiln
- Residues re-landfilled off-site (fee)
- Regained cleaned-up land sold as building land & municipality gains land tax
- Avoided after care costs for 70 years



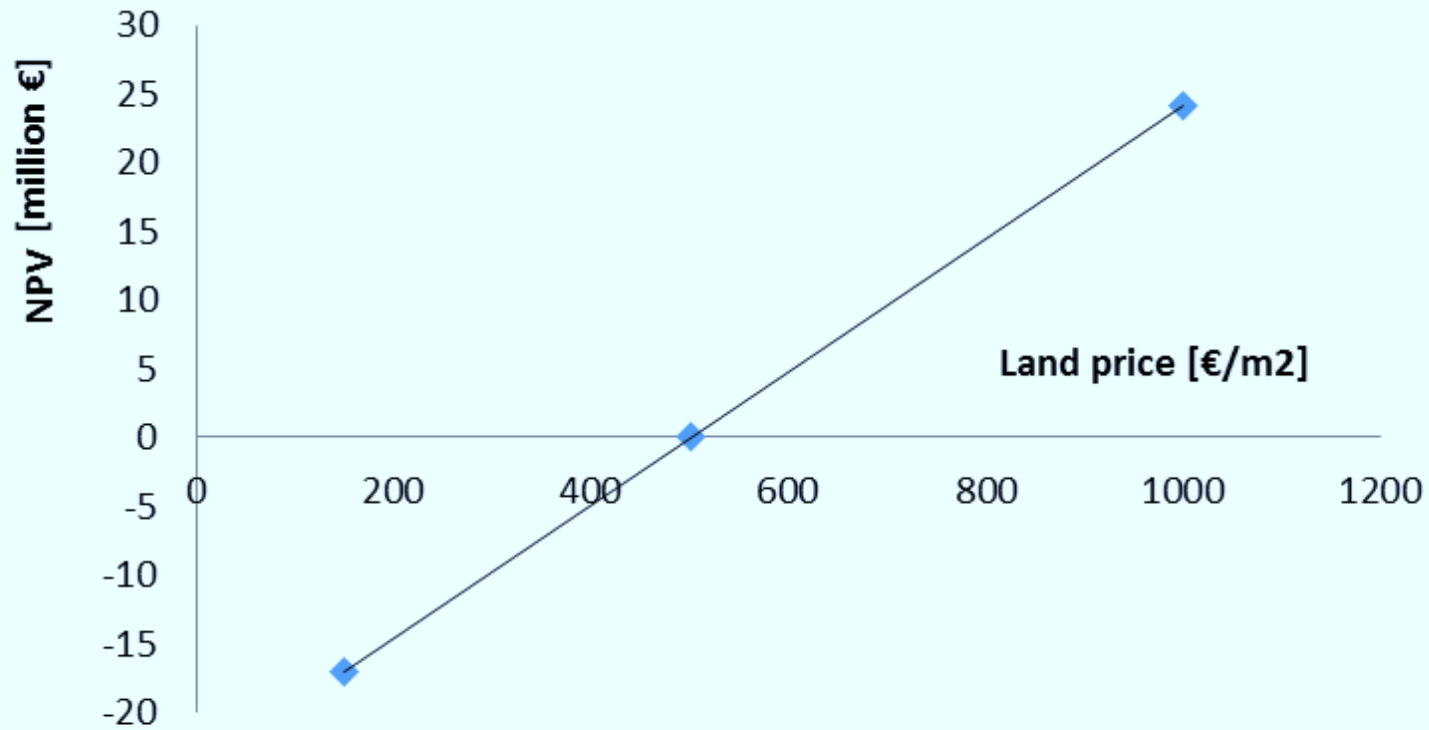
	Unit	
<b>Regained salable land</b>	[m <sup>2</sup> ]	50,000
<b>Solid Recovered Fuel (SRF)</b>	[t]	129,200
<b>Soil / construction material</b>		207,400
<b>Amount of materials to be re-landfilled (sorting residues)</b>		34,600

# Results II – Economics

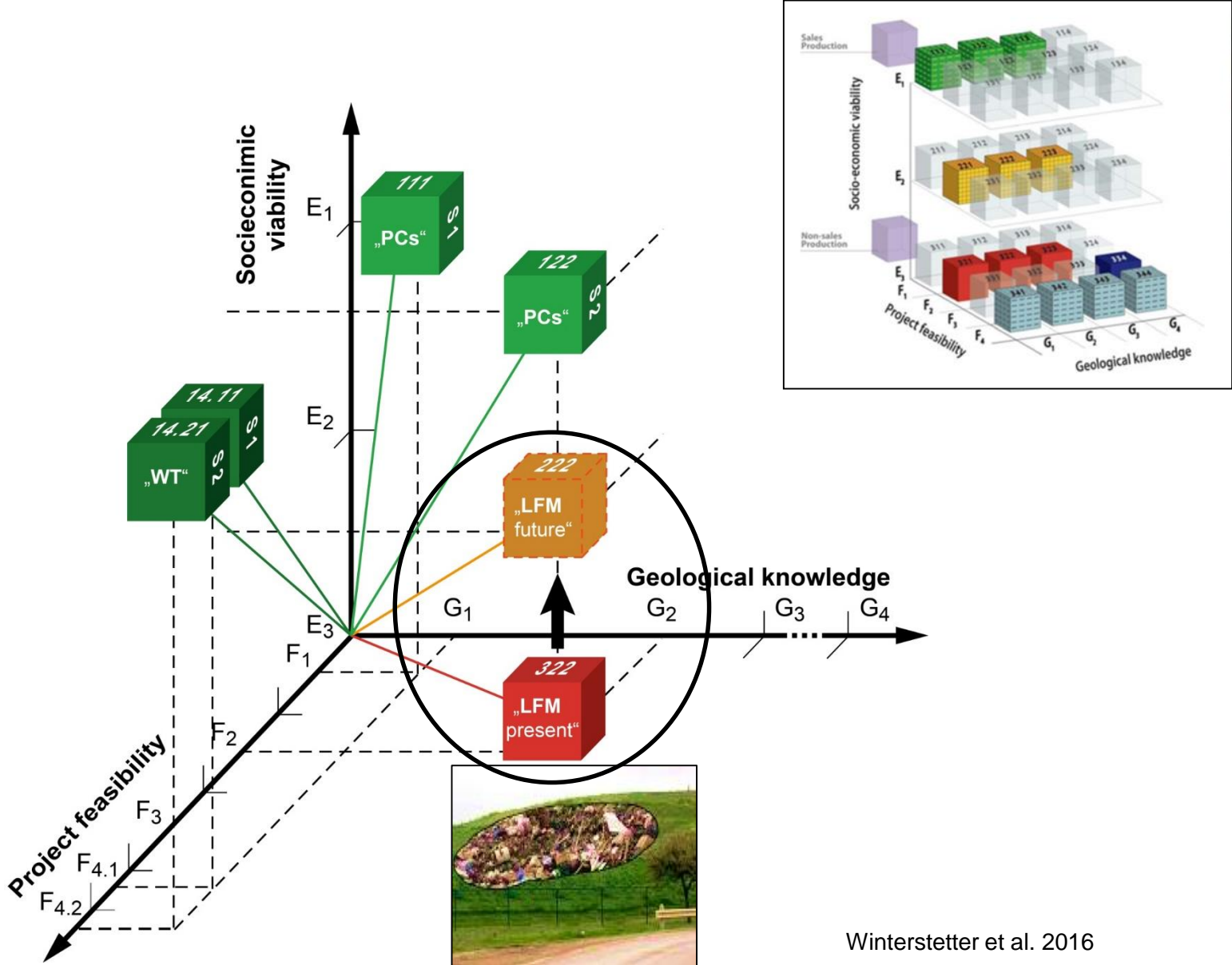


Total discounted cost (million €)	-28
Total Net Present Value (NPV) (million €)	-17
NPV in € / t excavated waste materials	-44

**Net Present Value (NPV)**



NPVS as a function of varying values of land prices



## **4. Conclusions & Outlook**



## Classification of old landfills under UNFC-2009 possible & depends on a number of factors:

- Preconditions: “Push” (Remediation) or “Pull” (Resource / land recovery)?
- Stakeholder perspective: Private or public investor?
- System variables: Choice of technology, project set-u, legal & institutional framework etc.
- Modifying factors: Commodity & land prices, treatment costs etc.
- Inclusion of non-monetary effects
- Evaluation must be performed on a case by case basis
- Further historic landfill sites in Flanders will be investigated



**UNFC-2009 suitable platform for classifying & evaluating**

**a) Old landfills**

**b) Further types of anthropogenic resource deposits**

**c) Compare anthropogenic & geogenic deposits**

Fundamental applicability of UNFC-2009 to anthropogenic resources proven

Evaluation procedure & definition of criteria in line with axes / classes of UNFC-2009 for LFM

## Outlook:

Inclusion of externalities  
Consistency & transparency:  
What institutions to involve, e.g. for data collection?  
Create platform for geogenic & anthropogenic resources

**Classification of anthropogenic resources under UNFC-2009**

Characteristics of anthropogenic resource deposits investigated

New methodology applied to three case studies & refined

UNECE expert group on resource classification  
OVAM: RECLAF project

# Thank you very much!

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