Waste Prevention: Life Cycle Costing of Food Waste Management

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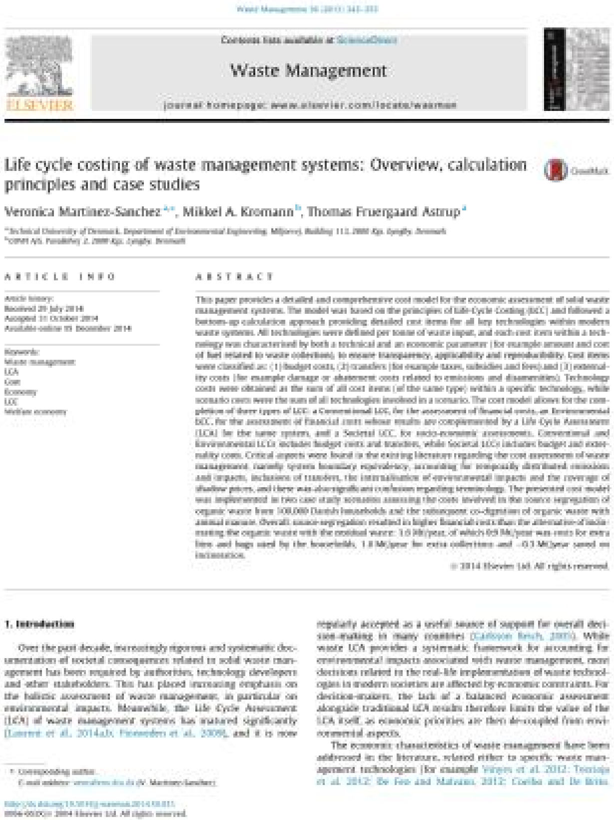
Related studies: Life Cycle Costing (LCC) principles and assessment of food waste



Contents lists available at ScienceDirect

Waste Management

journal homepage: www.elsevier.com/locate/wasman

Life cycle costing of waste management systems: Overview, calculation principles and case studies

Veronica Martinez-Sanchez, Mikkel A. Kromann, Thomas Fruergaard Astrup

ARTICLE INFO

ABSTRACT

1. Introduction

Environmental Science & Technology

Article

Life-Cycle Costing of Food Waste Management in Denmark: Importance of Indirect Effects

Veronica Martinez-Sanchez, Davide Tonini, Hemming Møller, and Thomas Fruergaard Astrup

Supporting Information

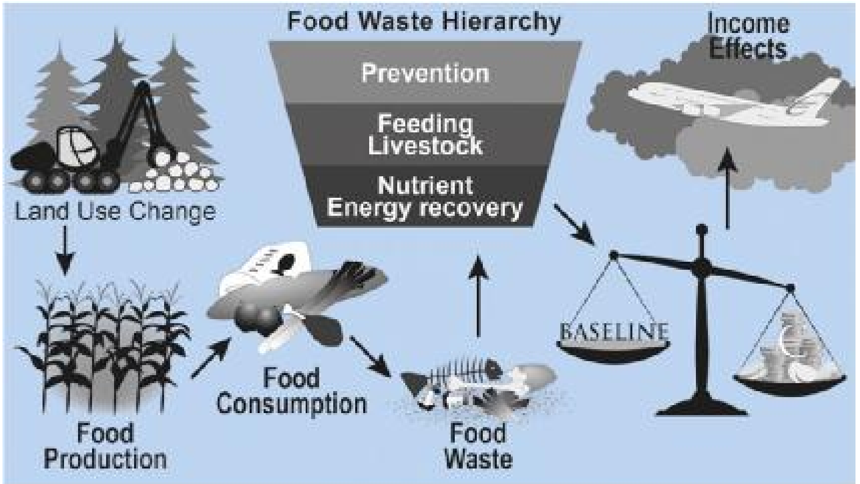
INTRODUCTION

ACS Publications

Martinez Sanchez, Kromann, Astrup (2015): Life cycle costing of waste management systems: Overview, calculation principles and case studies. Waste Management, 36, 343–355

Martinez Sanchez, Tonini, Møller, Astrup (2016): Life-cycle costing of food waste management in Denmark: Importance of indirect effects. Environmental Science & Technology, 50, 4513–4523

Background and focus



- One-third of food production is lost as waste
- Associated GW impacts correspond to 7 M cars in the UK
- Considerable economic losses
- Food Waste Hierarchy suggests alternatives

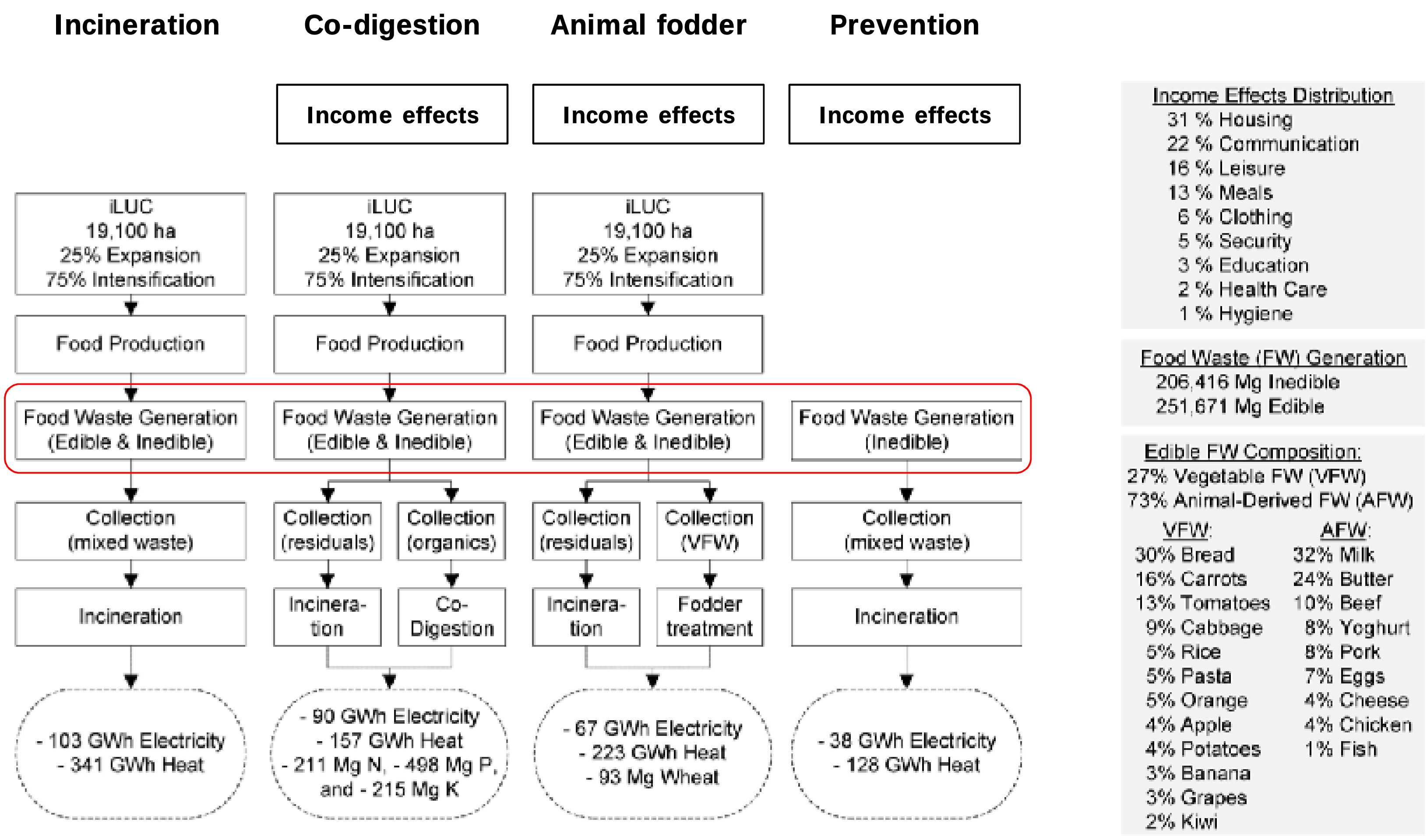
Food waste may support circular economy solutions:

- Very few studies offering consistent assessment
- Typically focus on direct effects
- Indirect effects may be significant

Food waste management may affect:

- Expenses in households
- Marginal consumption (indirect, welfare change)
- Emissions in society (indirect, welfare loss)
- Land-use-changes and ecosystem losses (indirect, welfare loss)

Four management scenarios



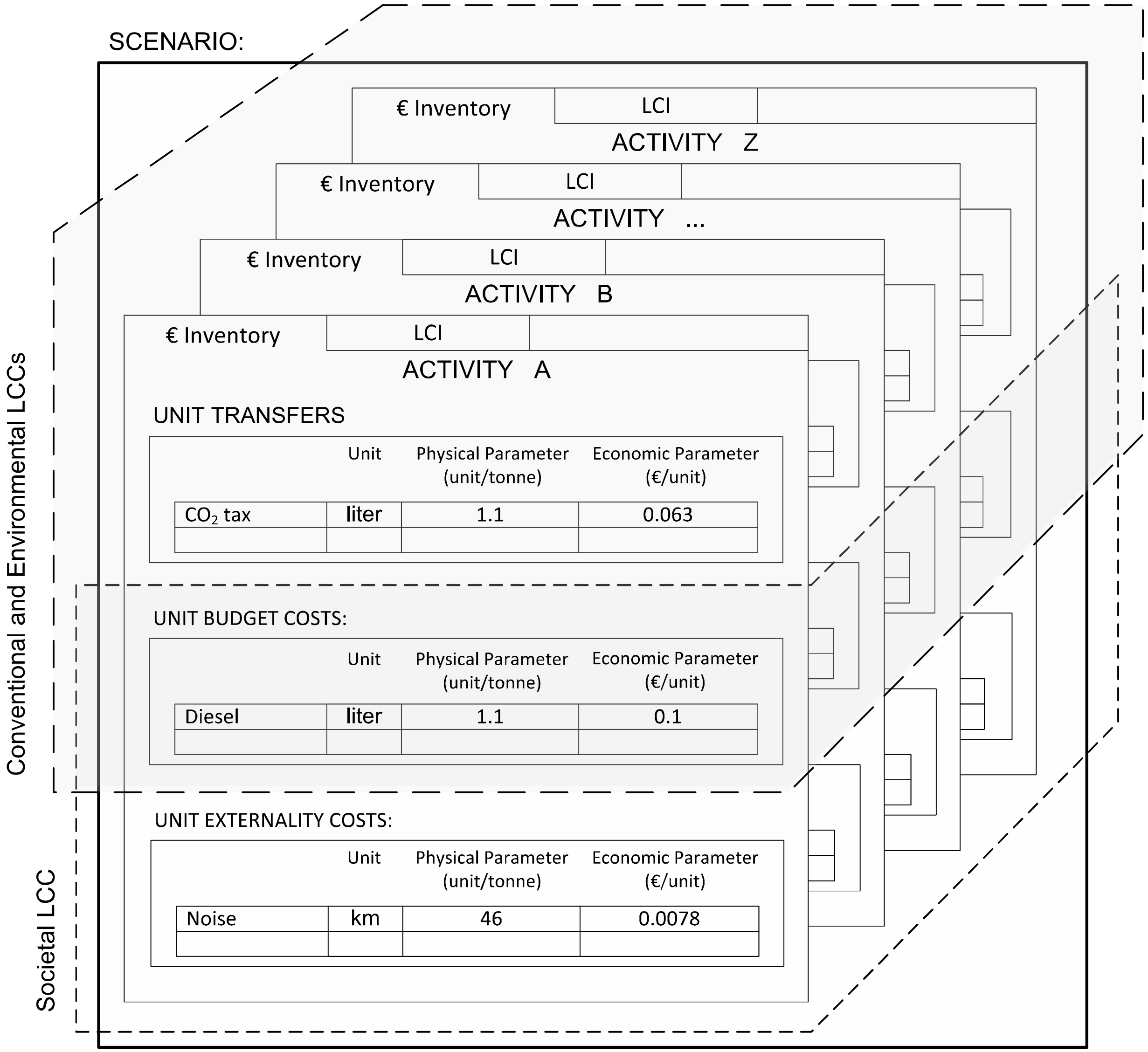
Martinez Sanchez, Tonini, Møller, Astrup (2016): Life-cycle costing of food waste management in Denmark: Importance of indirect effects. Environmental Science & Technology, 50, 4513–4523

Life cycle costing: methodology

	Conventional	Environmental	Societal
Type	Financial assessment of marketed goods and services	Conventional + Life Cycle Assessment	Conventional + Externalities
Example	§ Budget costs § Transfers	§ Budget costs § Transfers § LCA	§ Budget costs § Externality costs
Focus	An individual stakeholder: Internal costs	All affected stakeholders: Internal and external costs	All affected stakeholders: Internal and externality costs

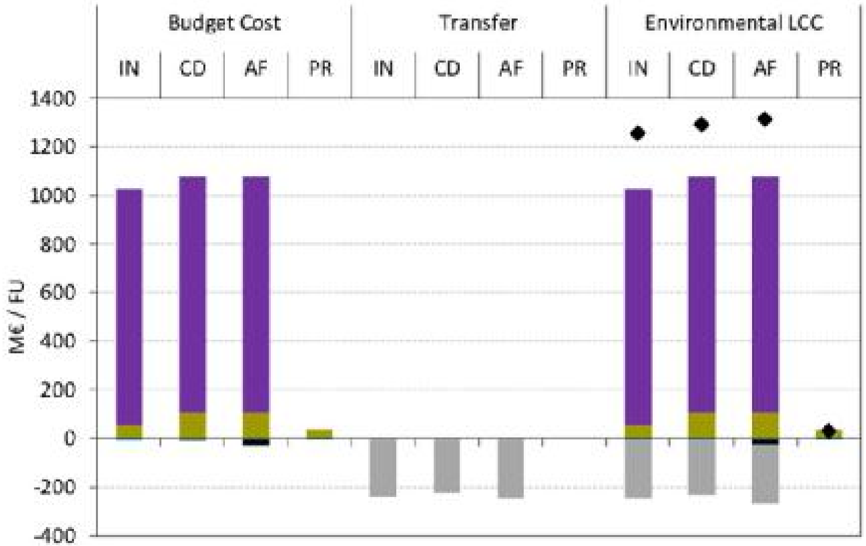
Martinez Sanchez, Kromann, Astrup (2015): Life cycle costing of waste management systems: Overview, calculation principles and case studies. Waste Management, 36, 343–355

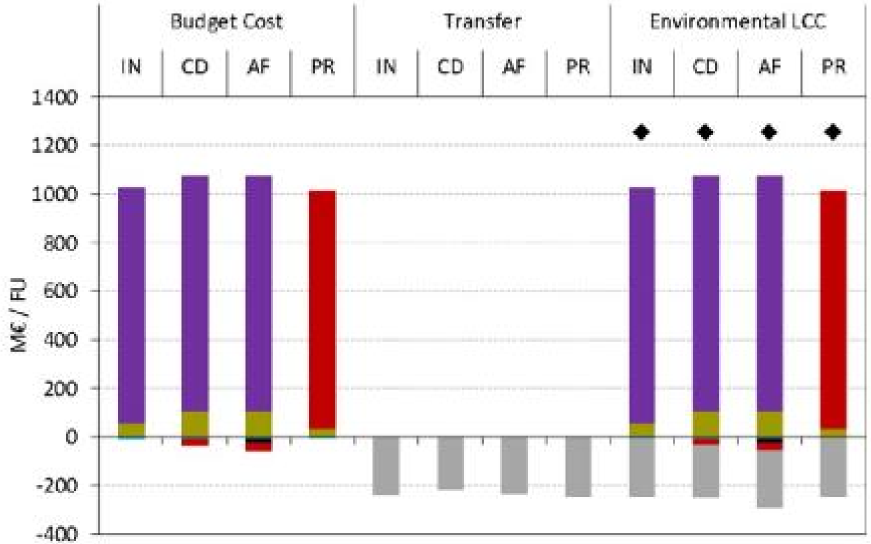
Cost types and modeling (EASETECH)



Martinez Sanchez, Kromann, Astrup (2015): Life cycle costing of waste management systems: Overview, calculation principles and case studies. Waste Management, 36, 343–355

Financial assessment



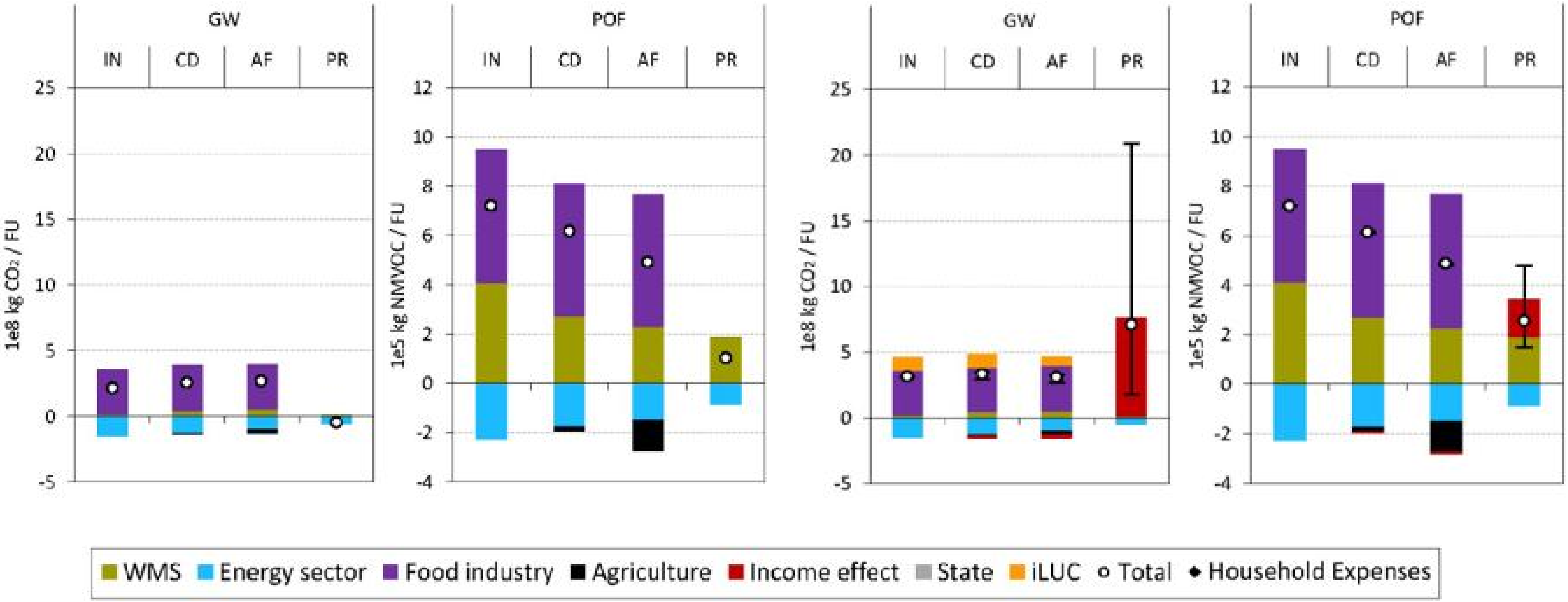


WMS · Energy sector · Food industry · Agriculture · Income effect · State · iLUC · Total · Household Expenses

Life cycle assessment

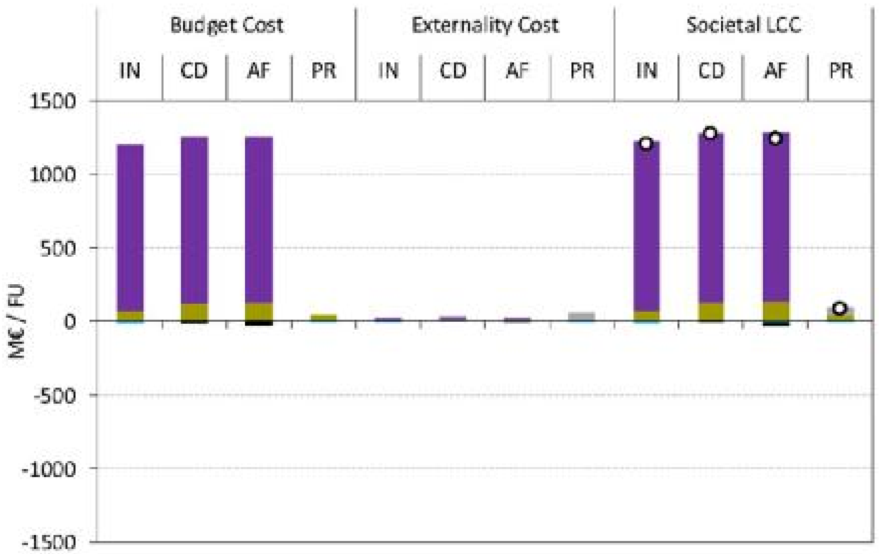
Direct effects

Direct + indirect effects

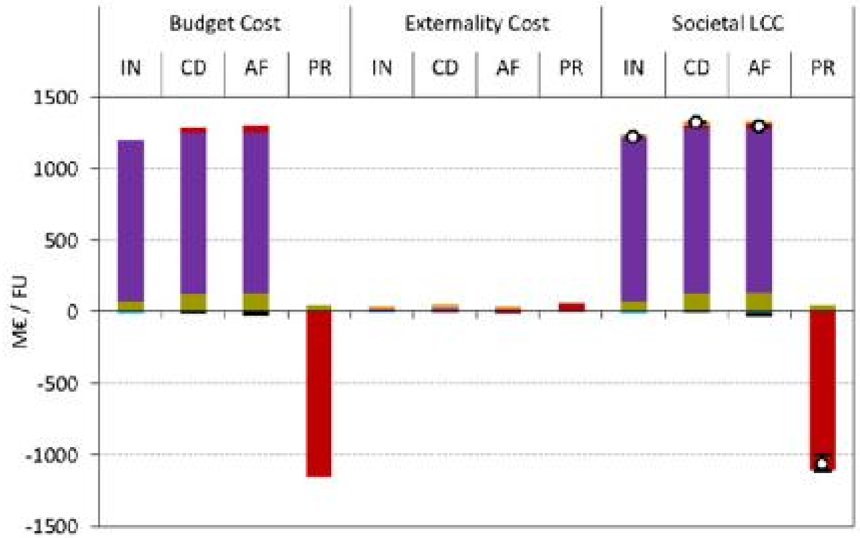


Welfare economic assessment

Direct effects



Direct + indirect effects



WMS ■ Energy sector ■ Food industry ■ Agriculture ■ Income effect ■ State ■ iLUC ○ Total ◆ Household Expenses

Summary

- Including only direct effects (without income effects), waste prevention *is* beneficial
- Including additional indirect effects (income effects), waste prevention *may* be environmentally beneficial
- Waste prevention initiatives *could* facilitate significant reduction in household expenses (welfare gain)
- LCAs of waste prevention and circular economy solutions may need to address economic consequences
- Cost assessments, however uncertain and limited, may be useful in this context
- Indirect effects from land-use-changes do not appear critical for cost assessments