Reed as a Renewable Resource 2013

## Sustainability assessment of common reed-based production

**Greifswald**, **Germany** 



Tanja Myllyviita\*, Ilona Joensuu, Raimo Heikkilä and Pekka Leskinen \*Researcher, Finnish Environment Institute (SYKE), E-mail: tanja.myllyviita@ymparisto.fi

## Contents

Sustainability of using common reed
Methods assessing sustainability=

 Life-cycle assessment (LCA) +
 Multi-criteria (decision) analysis (MCA)

Description of an empirical setup
Discussion on methodological and empirical challenges



## Sustainability of using common

- Common reed can be used for various purposes (energy, construction, fertilizer etc.)
- Utilization of common reed has several beneficial sustainability impacts:
  - Improved nutrient balance, positive biodiversity impacts
  - Recreational values improved, jobs for contractors
  - Economic profitability?
  - etc.

reed

## What is the most sustainable way to utilize common reed?

Leverage from

### Methods assessing sustainability: Life-cycle assessment (LCA)

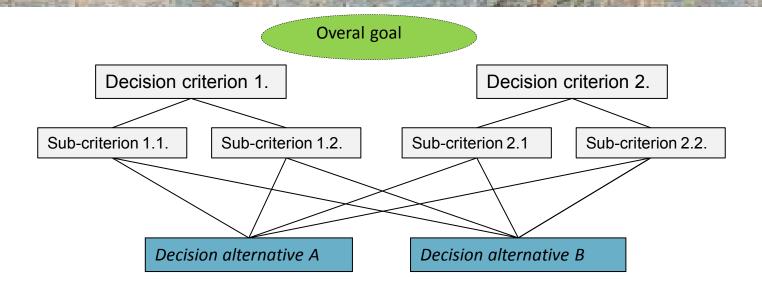
Environmental impacts of a product from a gradle to a grave

	Characterized Impact assessment scores		
	Alternative A	Alternative B	
Climate change	55 kg CO2-Eq	89 kg CO2-Eq	
Acidification	17 kg SO2-Eq	10 kg SO2-Eq	
Metal depletion	25kg Fe-Eq	8 kg Fe-Eq	

No unambiguous comparisons of alternatives!



### Methods assesing sustainability: Multi-criteria (decision) analysis (MCA)



 MCA determines the decision alternative with the highest utility with respect to decision-makers preferences

Leverage from

ironean Social Fur

- no advanced tools for assessing environmental (or other) impacts

Centre for Economic Development,

### Methods assessing sustainability Life-cycle assessment (LCA) +Multi-criteria (decision) analysis (MCA)

	Character assessm		
	Alternative A	Alternative B	Weight
Climate change	55 kg CO2-Eq	89 kg CO2-Eq	0.33
Acidification	17 kg SO2-Eq	10 kg SO2-Eq	0.33
Metal depletion	25kg Fe-Eq	8 kg Fe-Eq	0.33

Single scores: Alternative A = 32.01

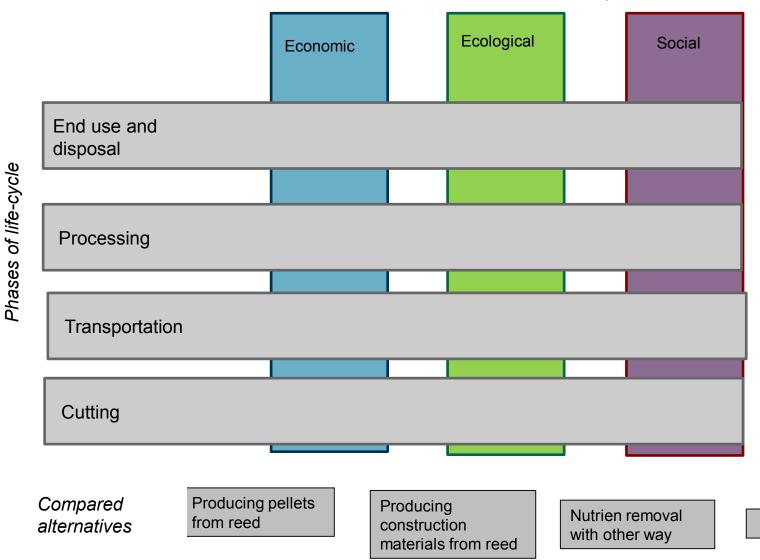
Alternative B:=35.31



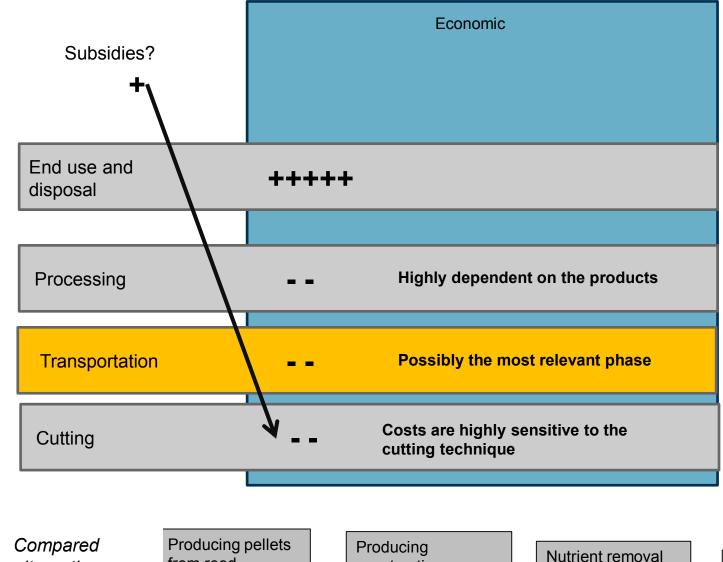
## Sustainability assessment of common reed-based production (a case-study in Eastern Finland)

Dimensions of sustainability

No actions



#### Economic sustainability of using common reed



construction

materials from reed

from reed

Phases of life-cycle

alternatives

No actions

with other way

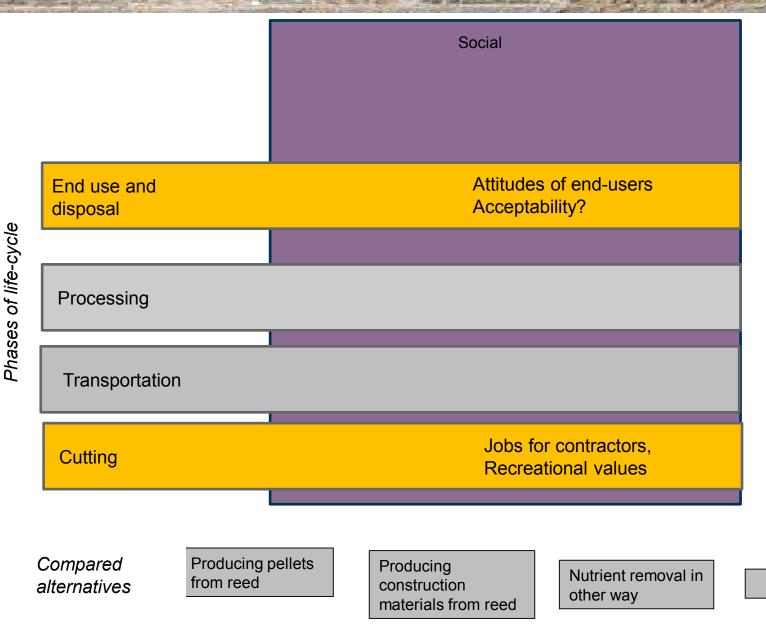
#### Ecolgical sustainability (=Life cycle anssessment) of using

common reed.

Also saved emissions considered!		Ecological		
			Impact categories us agricultural land occupation	əd in LCA:
)	End use and disposal		climate change fossil depletion freshwater ecotoxicity freshwater eutrophication human toxicity ionising radiation marine ecotoxicity marine eutrophication metal depletion natural land transformation ozone depletion particulate matter formation photochemical oxidant formation terrestrial acidification terrestrial ecotoxicity urban land occupation water depletion	
	Processing			
	Transportation			
	Cutting	biodiversity?		
	Compared Producing from reed	pellets construction materials from ree	Nutrient removal in	No actions

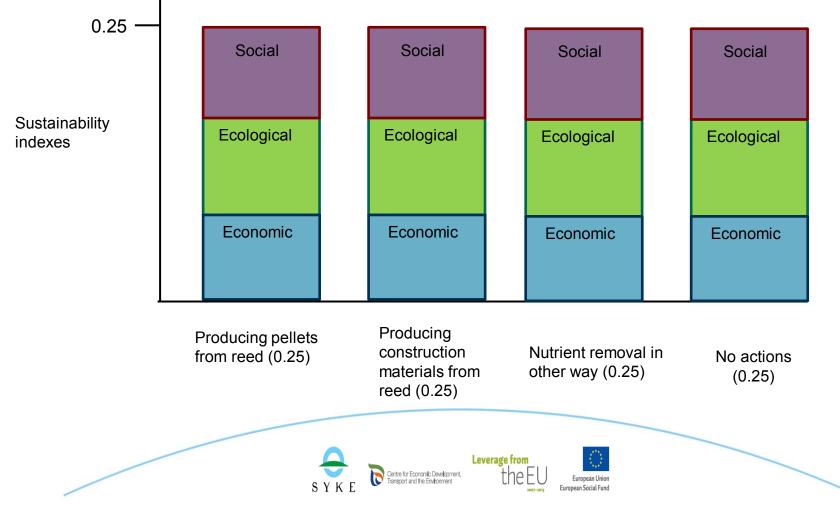
Phases of life-cycle

#### Social sustainability of using common reed



No actions

## Results of sustainability assessments (empirical results missing)



Leskinen P, Kähkönen T, Lähtinen K, Pasanen K, Pitkänen S, Sironen S et al. Moniulotteinen kestävyyden arviointikehikko puuenergian tuotannolle - Multi-dimensional sustainability framework to evaluate forest and wood energy production. Finnish environment 9/2012. (in Finnish)

# Discussion on methodological and empirical challenges

- Who should complete weighting
- Which MCA-method should be used
- Data availability
- How to compare environmental impacts to social and economic aspects
- Acceptability of the results

