

Assessing sustainability of forest based activities in rural areas of the Northern Periphery



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Multidimensional sustainability assessment of forest energy production

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Assessing sustainability of forest based activities in rural areas of the Northern Periphery



Outline

 Sustainability challenges in the Northern Periphery (and elsewhere)
The ToSIA tool and its application in the Northern ToSIA project
Assessing sustainability impacts of alternative bio-energy supply chains







Sustainability:

In 1987 the Brundtland Report provided a key statement on <u>sustainable development</u>, defining it as:

"[...] development that meets the needs of the present without compromising the ability of future generations to meet their own needs."





Sustainable Forest Management:

stewardship and use of forests, maintaining their

- biodiversity,
- productivity,
- regeneration capacity and
- vitality

to fulfil, now and in the future,

- ecological,
- economic and
- social functions.

Helsinki Resolution 1 - 1993







The sustainability concept evolved over the centuries



Sustainable development (Brundtland Report 1987)

Environmental, social, and economic dimension (EU sustainable development strategy, Gothenburg 2001 and EU Council 2006)

Today : Sustainable resource use AND sectoral value chains







Sustainability Challenges in the Northern Periphery

Environmentally friendly resource management

Securing social wellbeing in the region



Gällö in Jämtland, Sweden





Environmentally friendly resource use









Fotos: Anne & Horst Helwig www.helwig-naturfoto.de











Paper mill closure costs 250 jobs



People: the social dimension

- Recreational use increases in importance
- Forest sector offers employment
- Cultural values, ...

Stora Enso to shut down two factories in Finland and one in Sweden - 1,400 jobs to go



HELSINGIN SANOMAT

Residents of Kemijärvi staged their protest at the Stora Enso pulp mill on Thursday afternoon.

Photo: JAAKKO HEIKKILÄ









Value added:

• Forest-based sector is important for the regional economy





Gällö in Jämtland, Sweden

Foto: FVA Baden-Württemberg, Department of Forest Utilisation









The EFORWOOD Sustainability Impact Assessment Approach

Marcus Lindner European Forest Institute (EFI)

EFORWOOD (518128) review meeting, 17 March 2010, Brussels



www.eforwood.org







Forest-Wood Chains (FWC):

from tree regeneration to end-of life of wood products







Real world













Simple Forest Wood Chain Example











Every FWC process affects sustainability









ToSIA links sustainability indicators to FWC processes



Sustainability Indicators



Economic



Environmental



Social

Gross value added Production costs Resource use Total production Labour productivity Investment,Research & Development Trade Balance

Energy generation and use GHG emissions & carbon stocks Transport distance and freight Forest biodiversity Forest resources Water and Air Pollution Generation of waste Forest Damage Soil condition Transport Water use Employment Wages and salaries Occupational safety and health Education and Training Innovation Consumer behaviour & attitude Corporate social responsibility Provision of public forest services Wages and salaries Quality of employment

How to calculate FWC sustainability?



Overall sustainability is quantified by multiplying relative sustainability impacts





ToSIA is a tool to answer WHAT IF? - questions.

www.eforwood.org

What if:

- Bioenergy use triples?
- Natura 2000 policy strengthens?
- Paper industry shifts production away from Europe?





National statistics



ToSIA

Welcome 1

Data Preparation C

Chain runs Comparison

Analysis About

Welcome



This is ToSIA (Tool for Sustainability Impact Assessment), the decision support tool for forestry sector. With this tool forest-based industry, national and international policy makers and researchers can analyse the sustainability effects of changes due to deliberate actions (e.g. in policies or business activities) or due to external forces (e.g. climate change, global markets). ToSIA analyses environmental, economic, and social impacts of changes in forestry-wood production chains, using a consistent and harmonised framework from the forest to the end-of-life of final products. It allows user to analyse different kind of sustainability effects in a balanced way. The first versions of ToSIA are the products of the EFORWOOD project financed by the 6th Framework Program of the European Commission.



Tool for Sustainability Impact Assessment (ToSIA)

ToSIA













Northern ToSIA objective

Long-term goal: Improving sustainable forest resource use in the Northern Periphery



Project objectives:

- To test and develop the ToSIA tool in regional and company case applications
- To develop the tool applicability and necessary instructions for use in the Northern Periphery
- To disseminate the tool and user experiences for the whole Northern Periphery area







Alternative Bio-energy Supply Chains

Example from North Karelia, Finland

- Sustainability impacts of centralized vs. distributed forest bioenergy utilization
 - Tuupovaara Energy Co-operative (small scale DHP, distributed)
 - Outokumpu Energy (medium scale DHP, centralized)







Tuupovaara Energy Co-operative



- Small scale DHP in the village of Tuupovaara with two separate boilers 0.5 MW and 0.6 MW
- Uses mainly forest chips as fuel
- Co-operative is responsible for fuel procurement and operating the DHP; it makes contracts with local forest owners for the fuel procurement
- Annual heat production ca. 3300 MWh

Picture: Joensuun kaupunki





Outokumpu Energy Inc.



Picture: European Forest Institute

- Medium scale DHP with 10 MW and 7 MW boilers for solid fuels
- Activity almost fully automated
- Main fuels forest chips and sawmilling by-products
- Provides heat for over 200 customers in the area
- Energy sales in 2008: 53 000 MWh







FWC processes: Tuupovaara Energy Co-Operative

- Motor manual whole tree harvesting from young stand
- Forwarding of whole trees
- Roadside chipping (chipping entrepreneur)
- Transport of forest chips to DHP
- Storing of forest chips
- Heat production and delivery







FWC processes: Outokumpu Energy

- Mechanical whole tree harvesting from young stand (small harvester)
- Collecting of harvest residues from final felling
- Roadside chipping of whole trees and logging residues (drum chipper)
- Long distance transport of forest chips (chip trucks)
- Storing of forest chips
- Heat production and delivery







Economic indicators:



Gross value added, €/MWh 12 10,21 10 7,33 8 6 4 3,11 Tuupovaara Outokumpu 2 0 Gross value added Gross value added -2 (Subsidized) -4 -4,45 -6





Ecological indicators:







Social indicatos:

Employment, person a/1000 MWh



Wages and salaries, €/MWh







Scenario: Tuupovaara, more efficient chipper



Tuupovaara, Production costs, €/MWh

Tuupovaara, Greenhouse gas emissions from machinery, kg CO2 eq./MWh



EFI

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Scenario: Outokumpu, increased transport distance



Outokumpu, Production costs, €/MWh









Discussion

- ToSIA provides a methodology to analyse sustainability impacts of policy and technology changes
- It allows comparing a suit of different bio-energy supply chains against each other
- Ranking of alternative bio-energy supply chains requires processing of results with a multi criteria analysis-tool
- Quantified indicator results for alternative FWC options can be evaluated by different stakeholders according to their preferences for different sustainability dimensions
- ToSIA can thus serve as a platform for communication and argumentation with stakeholders





Outlook

- Northern ToSIA case studies are currently finalised
- Results will be presented in the Northern ToSIA Final Conference

Northern Forests Leading the Way to Sustainability -Northern ToSIA Final Conference

18.08.2011 - 19.08.2011 Rovaniemi, Finnish Lapland

www.northerntosia.org/portal/events







