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### ORCHARDS BIOMASS FOR ENERGY PURPOSES: AN APPROACH FOR THE ASSESSMENT OF THE IMPACT ON SOCIETY

Przemysław Bukowski\*, Jan den Boer, Arkadiusz Dyjakon

Institute of Agricultural Engineering, Wrocław University of Environmental and Life Sciences

\*Contact details: ul. Chelmońskiego 37-41, 51-630 Wrocław, e-mail: [przemyslaw.bukowski@up.wroc.pl](mailto:przemyslaw.bukowski@up.wroc.pl)

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#### ABSTRACT

*Analysis and evaluation of the impact on the social aspects and the social value of a given investment are still not a popular analysis applied in Poland. However, EU legislation and the practice of developed countries (including the U.S.) support the implementation of these analyzes. They are important from the point of view of the local community and that is why they are incorporated into the EuroPruning project. This article presents two types of analyzes: SLCA and SROI, which take into account in their methodologies the social aspects, i.e. impact on the condition and the satisfaction of the local community (social impact).*

### Introduction

Orchard biomass coming from apple, cherry, almond, grape or olive plantations is a significant and largely unused potential for renewable energy. The EuroPruning project aims at turning prunings into a valuable fuel source by developing solutions for their harvesting, transportation and storage that will create growth in the European biofuels market (Den Boer et. al, 2014). Usually, the legitimacy of the project/investment in Poland is considered mainly from the economic point of view. If required by legislation, an environmental analysis is performed, as well. Unfortunately, the social aspects connected with a venture are very often neglected and are not taken into consideration. It arises from the marginalization of this aspect, whereas the acceptance by local society (and the rest of stakeholders) seems to be crucial in terms of sustainable development of the region.

There are different analyses taking into consideration social aspects. To the most important belongs: Social Return On Investment (SROI) and Social Life Cycle Assessment (SLCA). In the project both analyses will be done: to determine the validity and added value of the Pruning-to-Energy (PtE) logistics chain, apart from economic and environmental aspects, social assessment studies will be performed. In this study, the PtE scenario will be compared to three current practices: open field burning, mulching and use for domestic heating.

The aim of this paper is to present the strategy of the EuroPruning project focusing on the main assumptions, the methodology to be applied and final targets which should allow choosing the best way of pruning treatment in terms of environmental, economic and especially social aspects.

### Social aspects in the EuroPruning project

All elements of the logistics chain may be analyzed also in terms of social aspects. For example: almost every element of logistics chain can create new jobs by orchards biomass collection, by servicing of machinery, by energy production etc. There are also negative aspects as well, for instance a danger of accidents or pollutants emission increase by the machineries. Social outputs are all transactions and activities coming from logistic chain implementation (negative like injuries, and positive like job creation) which value can be measured and expressed in Euro. According to the SROI analysis there are also other effects coming from outputs, called as “social outcomes” (see fig. 1). Social outcomes are indirect benefits from enterprise like: integration of society among the new project, increase of local society’s environmental awareness, improved welfare thanks to new jobs, rise of practical skills of local community (by involving the society to new tasks and responsibilities), better health (lower GHG emission), or finally higher responsibility of consumers health and safety, because consumers and producers belong to the same local community.

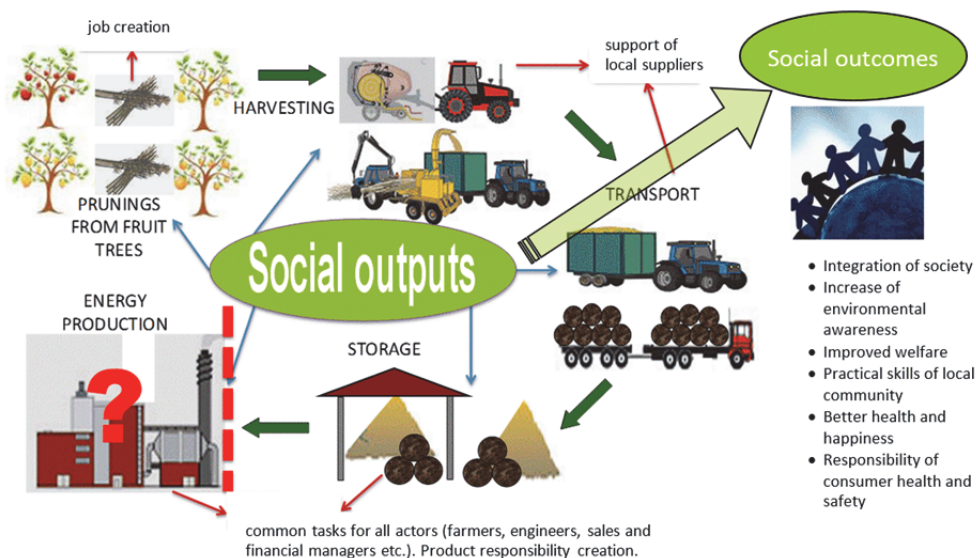


Figure 1. The social scope within the EuroPruning project (adapted from Dyjakon et al., 2014)

Social aspects in the EuroPruning project will be taken into consideration within two kinds of analysis: SROI and SLCA.

### Social Return on Investment (SROI)

The SROI analysis means the Social Return On Investment and it grew up from ROI analysis (Return On Investment), which are quite straightforward and commonplaces within many organizations all around the world. The SROI analysis adds to typical financial analysis another, new activities evaluated as “social value”. Social value refers to social, environmental and economic costs and benefits taken into consideration simultaneously. By taking these values into consideration the social impacts may be evaluated, which result from positive or negative pressures on social endpoints (i.e. well-being of stakeholders).

The term “social impact” is defined as the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society (The Interorganizational Committee, 2003). The origin of Social Impact Assessment (SIA) comes from the environmental impact assessment (EIA) model, which were first implemented in the 1970’s in the U.S, as a method to assess the impacts on society of different projects (Barrow, 2000). The term also includes “cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society” (The Interorganizational Committee, 2003). The common opinion about SROI is, that this analysis could be ambiguous, while it is basing on social value, which refers to social, environmental and economic costs and benefits. To collect all important data for a project the impact value chain should be defined.

Based on the “Impact value chain in The Double Bottom Line” (Clark et al., 2008) the value chain for EuroPruning was proposed and presented in figure 2.

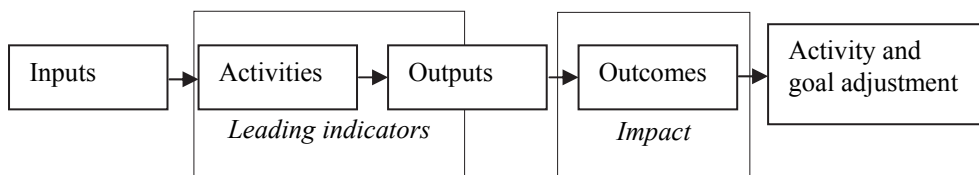


Figure 2. EuroPruning impact value chain (based on Clark et al., 2008)

Inputs includes all the elements which are put into venture (for example, machinery, logistics and know – how). Activities are venture’s primary activities, means pruning acquisition, utilisation and energy production.

Impact value chain allows to differentiate between outputs and outcomes. Outputs are results that a company, or a project manager can measure or assess directly. Outputs could include the number of workplaces created, saved energy or benefits of the use of renewables, associated with green energy production. Social impact indicators are specific operational outputs that can be measured by meeting their social benefit objectives.

Outcomes are the changes in society. For the EuroPruning project, desired outcomes could be increasing i.e. the society benefits, including family support for basic commodities and workforce facilities.

Impact refers to the portion of the total outcome as a result of the farmers and energy producers activity. It should answer the question “what would have happened anyway” by the alternative solution.

### **Social Life Cycle Assessment (SLCA)**

Social life cycle assessment is a social impact (and potential impact) assessment technique that aims to assess the social and socio-economic aspects of products and their potential positive and negative impacts along their life cycle encompassing extraction and processing of raw materials, manufacturing, distribution, use, re-use, maintenance, recycling, and its final disposal (Benoit and Mazijn, 2009).

There are many methodologies taking into consideration different criteria. A reasonable and prudent choice of methodology and criteria is very important. The most popular or the most compatible to EuroPruning project methodologies are:

1. Life Cycle Sustainability methodology proposed by Barthel et al. (2005),
2. Methodology presented by Dreyer et al. (2006),
3. Corporate Social and Environmental Performance described by Gauthier (2005),
4. Societal LCA methodology by Hunkeler (2006),
5. Social impacts of the production of notebook PCs by Manhart & Grieshammer (2006),
6. Venture capital fund by Méthot (2005),
7. Label 'Sustainable Development' by Spillemaeckers et al. (2004),
8. Sustainability SWOTs by Pesonen (2007),
9. The integration of economic and social aspects by Weidema (2006),
10. Methodologies used for ZeroWIN (ZEROWIN 2010),
11. Methodology applied by TransWaste (Transwaste 2012).

The first methodology contains a method to assess social impacts on people caused by the activities in the life cycle of a product (Barthel et al. 2006). The next methodologies (no. 2-5) come from development of LCA analysis, enriched by social aspects, which is a popular method recently. An interesting position is also the sustainability SWOTs by Pesonen basing on the popular SWOT analysis, but the most accurate methodology to the EuroPruning project were published in TransWaste final report (TransWaste 2012). In this work the societal Life Cycle Assessment and analysis of social impacts were studied in order to come up with an approach to assess the social impacts of the informal collection, transport and trade of used items. The most important step in SLCA is a proper choice of social criteria. The social criteria are concerned with the ways in which society (and particularly farmers) would use the new logistics and renewable energy as part of their everyday lifestyles. In described above methodologies the main groups of social criteria are:

1. Human rights.
2. Labour practices and decent work conditions.
3. Social.
1. Product responsibility.

The first group of criteria seems unimportant in EuroPruning project. Human rights are taking into consideration problems like: non-discrimination (composition of employees according to gender, age, disabled, part-time workers), freedom of association and collective bargaining or child labour threat, including hazardous child labour. In the project this threats are negligible – all scenarios take place in Europe, so human rights respecting will not change.

Much more important is the second group of criteria: labour practices and decent work conditions. Wages, including equal remuneration on diverse groups, regular payment, length and seasonality of work and minimum wages, benefits, including family support for

basic commodities and workforce facilities, and finally physical working conditions, including rates of injury and fatalities, nuisances, basal facilities and distance to workplace will highly affect the impact.

To the social aspects evaluated during the EuroPruning project belong: development support and positive actions towards society, including job creation, support of local suppliers, general support of developing countries, investments in research and development, infrastructure, and local community education programmes. Additionally, the local community acceptance (such as complaints from society, and presence of communication channels) and ensuring of commitment to sustainability issues from and towards business partners seems to be vital, as well.

The product responsibility is hard to estimate, but it influences the social impact definitely. It is important to society the integration of customer health and safety concerns in product, such as content of contaminants, other threats/benefits to human health due to product use. Fuel from biomass (prunings) should be introduced to users as a product, with all marketing activities such as labelling, information about ingredients, origin, use, potential dangers, and side effects.

## **Conclusions**

The increase of renewable energy production from biomass is a very important task for European Countries in the coming years. For a reliable assessment of a new logistic chain for the biomass from pruning residues the SROI and SLCA analysis is required. Biomass harvesting methods, the transport, storage, and utilisation for energetic purposes influences the society, and the main task of SROI analysis is social impact evaluation, made by impact value chain creation.

The SLCA methodology comes from development of LCA analysis, and applies the criteria in the three main groups: labour practices and decent work conditions, social, and product responsibility.

For the project the SLCA methodology was assumed, and the most important criteria were chosen. The next step is collection of data from evaluated localisations (Potsdam, Bordeaux and Zaragoza) and social impact elaboration according to adopted methodology, criteria and assumptions.

To the most important social indicators include: employment and job creation (in man-hour per GJ of acquired energy), influence on health of the society, and product responsibility. They should refer to energy production (GWh per 1 person or GWh per hectare), to the LCA (Life Cycle Assessment) like climate impact (GHG emissions), bioenergy policy and finally to the micro-scale changes. The final value of all comparisons should be calculated and expressed in Euro.

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## BIOMASA Z SADU NA CELE ENERGETYCZNE: SPOSÓB PODEJŚCIA PRZY OCENIE WPŁYWU NA SPOŁECZEŃSTWO

**Streszczenie.** Analiza i ocena wpływu społecznych aspektów na wartość inwestycji wciąż nie należy do popularnych analiz stosowanych w Polsce. Jednak ustawodawstwo Unii Europejskiej oraz praktyki z krajów wysoko rozwiniętych (w tym USA) wskazują na zasadność przeprowadzania także tych analiz. Aspekty społeczne są ważne z punktu widzenia rozwoju gospodarczego regionu (także w obszarze rolniczym) i stanowią istotne uzupełnienie analiz ekonomicznych oraz środowiskowych. Z tego względu, wskaźniki społeczne są także przedmiotem rozważań realizowanego projektu EuroPruning, którego zadaniem jest opracowanie nowej metody logistycznej pozyskiwania, transportowania, magazynowania i wykorzystania ściniek gałęzi z drzew owocowych dla celów energetycznych. W artykule przedstawiono dwa typy analiz uwzględniających wpływ aspektów społecznych na analizę cyklu życia (SLCA) oraz zwrot inwestycji (SROI). Omówiono metodykę badawczą oraz problematykę oceny i wyboru odpowiednich wskaźników opisujących aspekty społeczne w zadanych warunkach.

**Słowa kluczowe:** biomasa, gałęzie drzew owocowych, produkcja energii, aspekt społeczny, SROI, SLCA