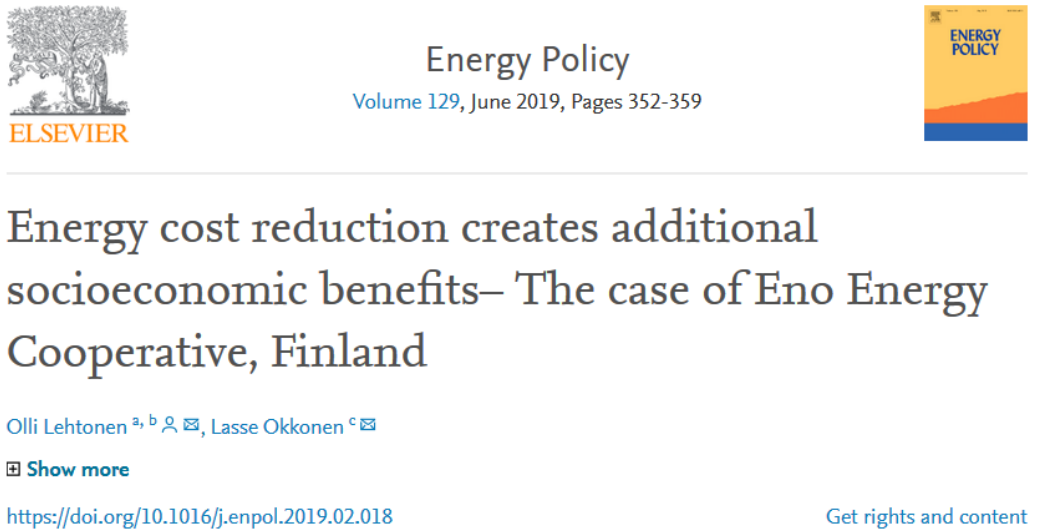
PEOPLE AND NETWORKS MATTER ENABLING SUSTAINABLE BIOECONOMY TRANSITION, 27.3.2019, Karlstad.
Session: Bioeconomy in Nordic countries: Smart and innovative development opportunities or empty promises for communities and regions?

Energy cost reduction creates additional socioeconomic benefits– The case of Eno Energy Cooperative, Finland



Olli Lehtonen[1,2] & Lasse Okkonen[3]

[1] Natural Resources Institute Finland

[2] University of Eastern Finland

[3] Karelia University of Applied Sciences

Contact: olli.lehtonen@luke.fi

Short introduction

- Socio-economic benefits of bioenergy utilization can clearly be identified as a significant driving force in increasing the share of bioenergy in the total energy supply as well regional employment created and economic gains.
  - However, there is no information or studies about the long-term socioeconomic impacts of the use of the bioenergy
- Two “assumptions”:
  1. Socioeconomic effects are generated by the investment project usually involved to establish bioenergy system, employment effect of local fuel supply and running the plant and the money circulated in local economy instead of paying it to fossil fuel supply companies from “elsewhere”. (NORMAL INVESTMENTS)
  2. In many cases, for instance in heat production, bioenergy can also be a cheaper option for consumers and so release more money for other uses in the local economy. (ENERGY COST REDUCTION)

In this study:

- Objective is to test previous assumptions and analyze the socioeconomic impacts of the bioenergy production from 2001 until 2015 in a remote community located in Eno.
- We also analyze the conditions that can realize the above “assumptions”.

Is this the only picture?

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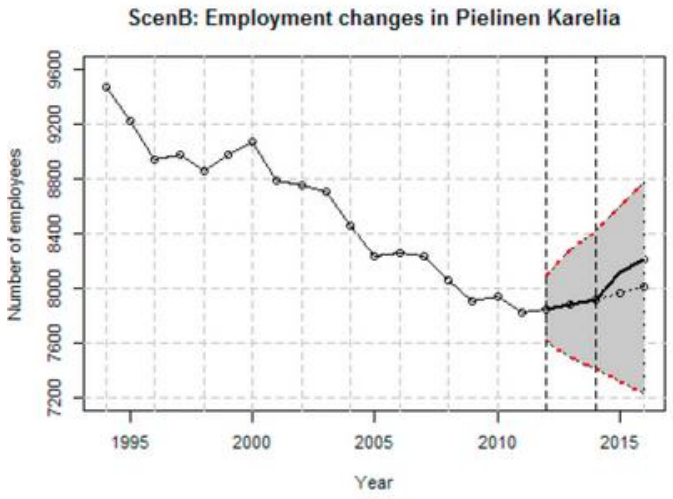
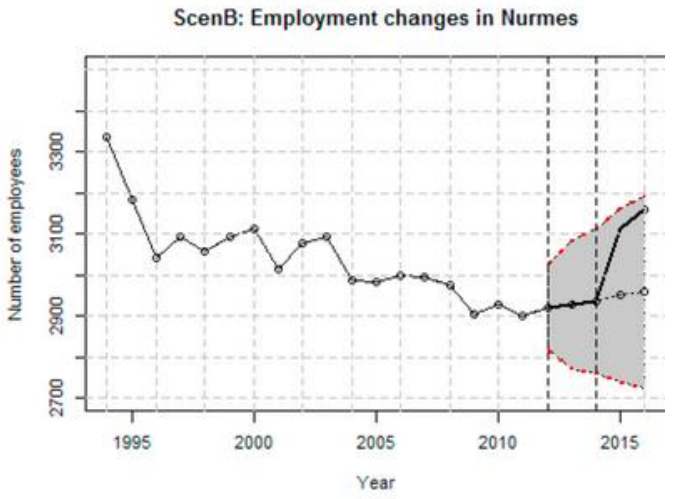
Socio-economic impacts of a local bioenergy-based development strategy – The case of Pielinen Karelia, Finland

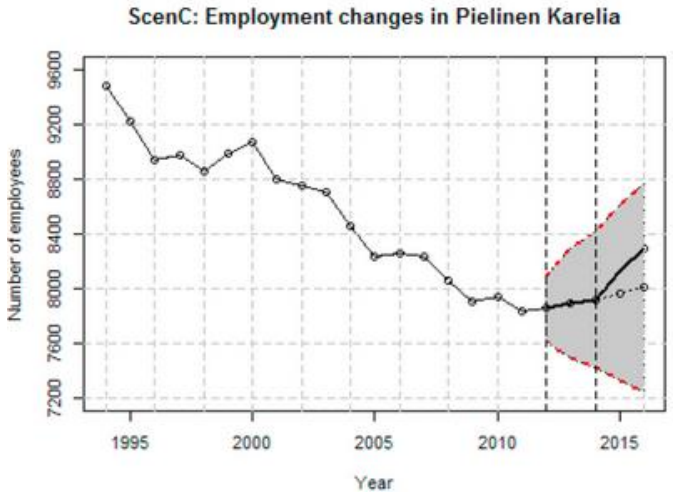
Olli Lehtonen [a], Lasse Okkonen [b, *]

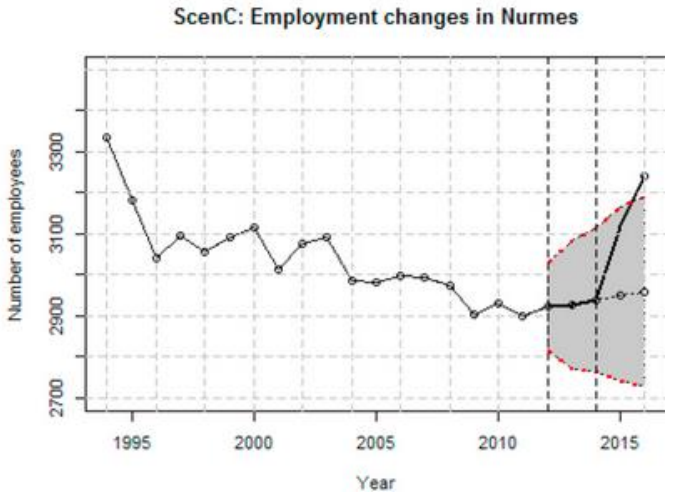
[a] Natural Resources Institute Finland, Rural Policy and Research, Helsinki, Finland
[b] Karelia University of Applied Sciences, Energy and Environmental Technology, Joensuu, Finland

- The local development strategy in Nurmes, focusing diversification into a new and related industry, was able to put an end to the negative development path that had persisted since the mid-1990s.
- Without new **massive** investments and upgrades in industrial production, the resource periphery would suffer negative regional lock-in with increasing depopulation, declining employment and increasing unemployment.
- This lock-in does not inhibit new paths but defines opportunities and limits possibilities for new paths, keeping the negative path in the region alive
- *What about local decentralized bioenergysystems and their value creastion?*





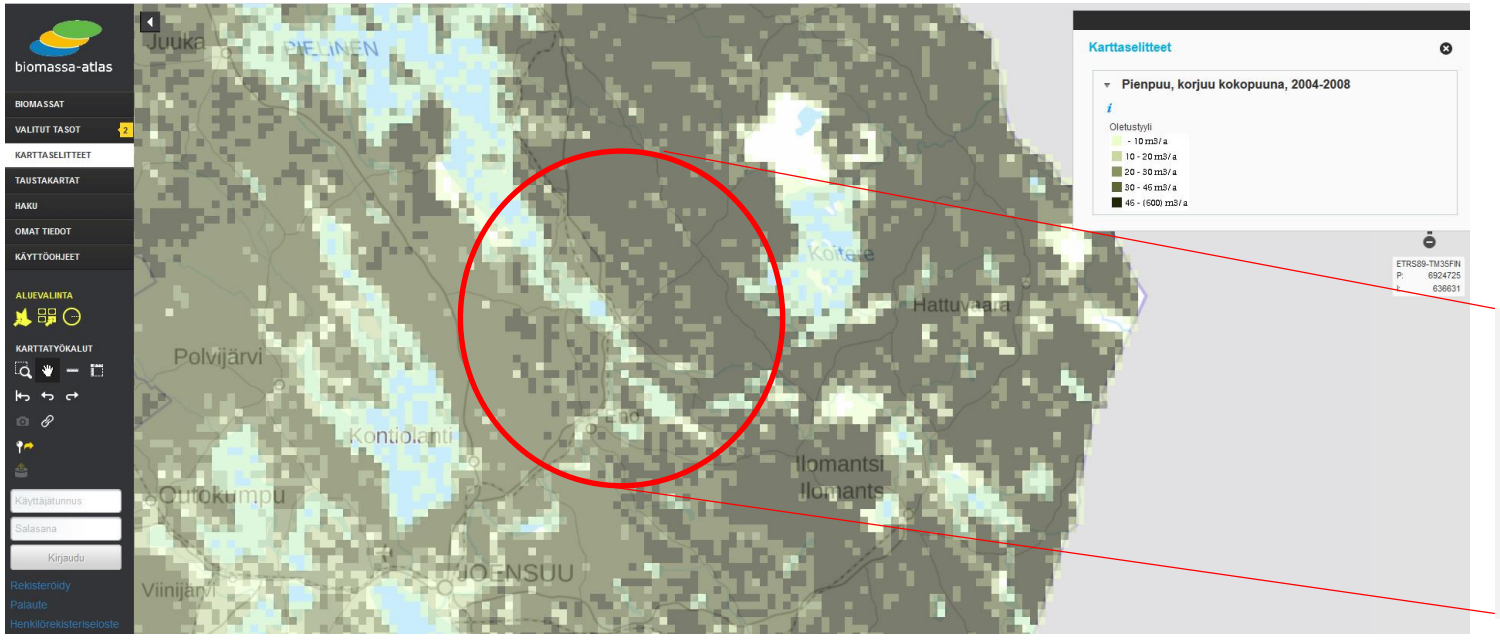


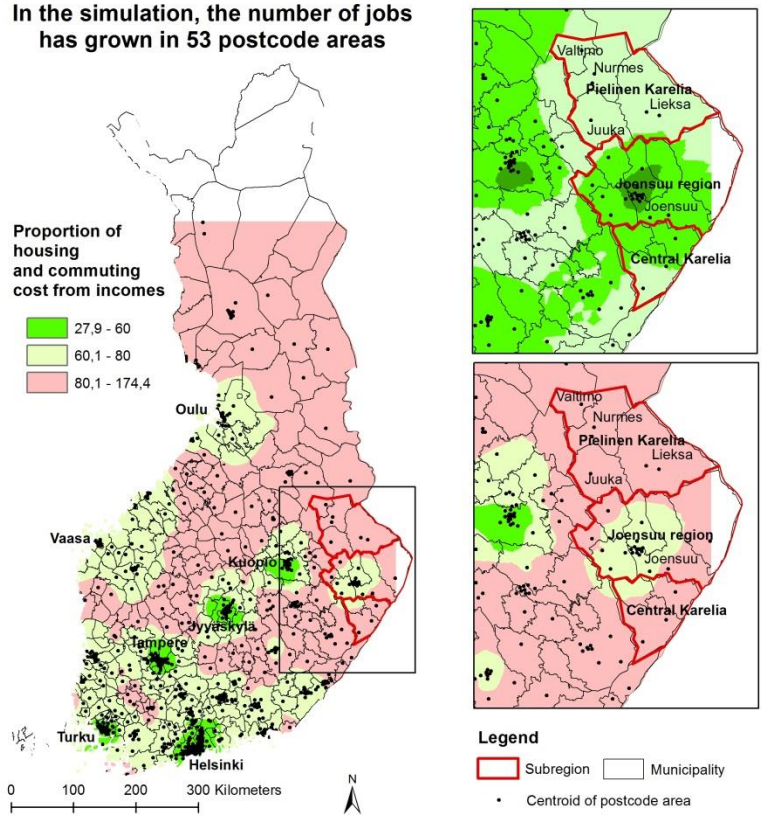


Case 2: Heat entrepreneurship – Eno Energy co-operative

- The analysis focuses on the socioeconomic impacts of the biomass-based district heat production on employment and income in community of Eno, located in North Karelia, Finland.
- Eno is a small traditional industrial community in a resource periphery challenged by the negative lock-in of the local development (declining population and living standard) and it is located outside the main commuting zone of Joensuu.

This case aims to demonstrate the added value of the use of local resources in rural-urban collaboration.





Eno Cooperative operates in area which has abundant forest resources (wood biomass).

The main customers are the city of Joensuu (urban area) and local households (rural area).

Eno Energy co-operative

Enon Energia Osuuskunta

Local, renewable woodenergy

- Eno energy co-operative is a community-based enterprise located in North Karelia, Finland which has been established in 1999.
- The co-operative is owned by local forest owners.
- The co-operative was founded as a joint effort of different actors:
  1. the municipality wanting to change heat production from oil to wood and advance rural livelihood,
  2. local Forestry Centre having development projects related to advancing forest energy and wanting to advance forest energy related development in the region,
  3. and the local forest owners finally founding this energy co-operative.

Bioenergy case: Eno energy cooperative

Business concept of Eno Energy Cooperative

To produce district heating energy by providing woodchips for the three heat production/distribution plants.

Uimaharju heating plant

Eno alakylä heating plant

Eno yläkylä heating plant

More information:
http://enonenergia.fi/node/6

Commercial operation started: 2004
Boilers: 0.8 MW_{th} + 1.2 MW_{th} with 1 MW heating oil burner as backup system
Heated volume: 121 900 m³; municipal office building, the health centre, the fire station, old people's home, business premises and fourteen terraced houses.
Heat production: 6 600 MWh a year
Fuel consumption: aprx. 11 500 loose-m³ of woodchips

Eno alakylä heating plant

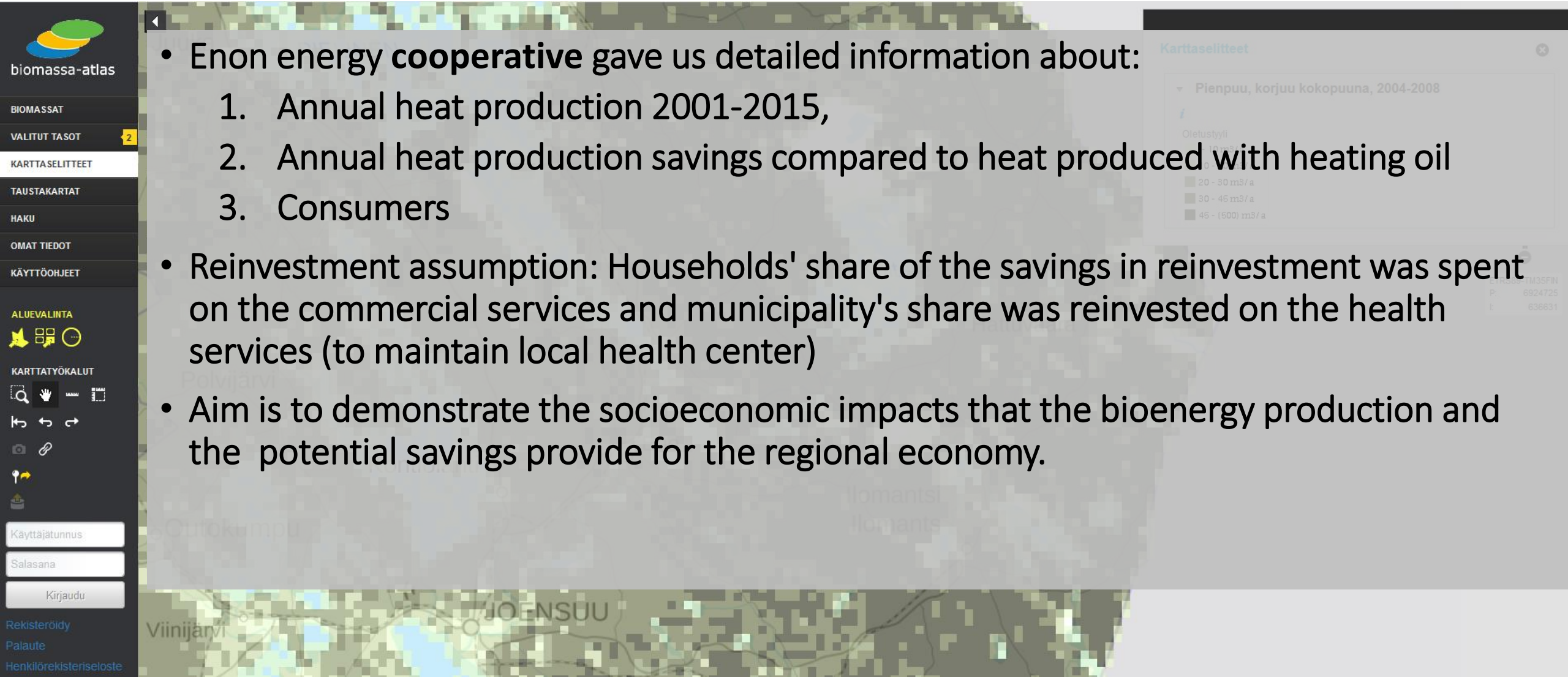
Commercial operation started: 2002
Boilers: 1 MW_{th} + 1 MW_{th} (+ 1 MW_{th} heating oil boiler as backup system)
Heated volume: 93 000 m³; the primary and secondary school, the health centre and the municipal community centre church building and fifteen terraced houses
Heat production: 5 000 MWh a year
Fuel consumption: aprx. 9 000 loose-m³ of woodchips

Uimaharju heating plant

Eno yläkylä heating plant

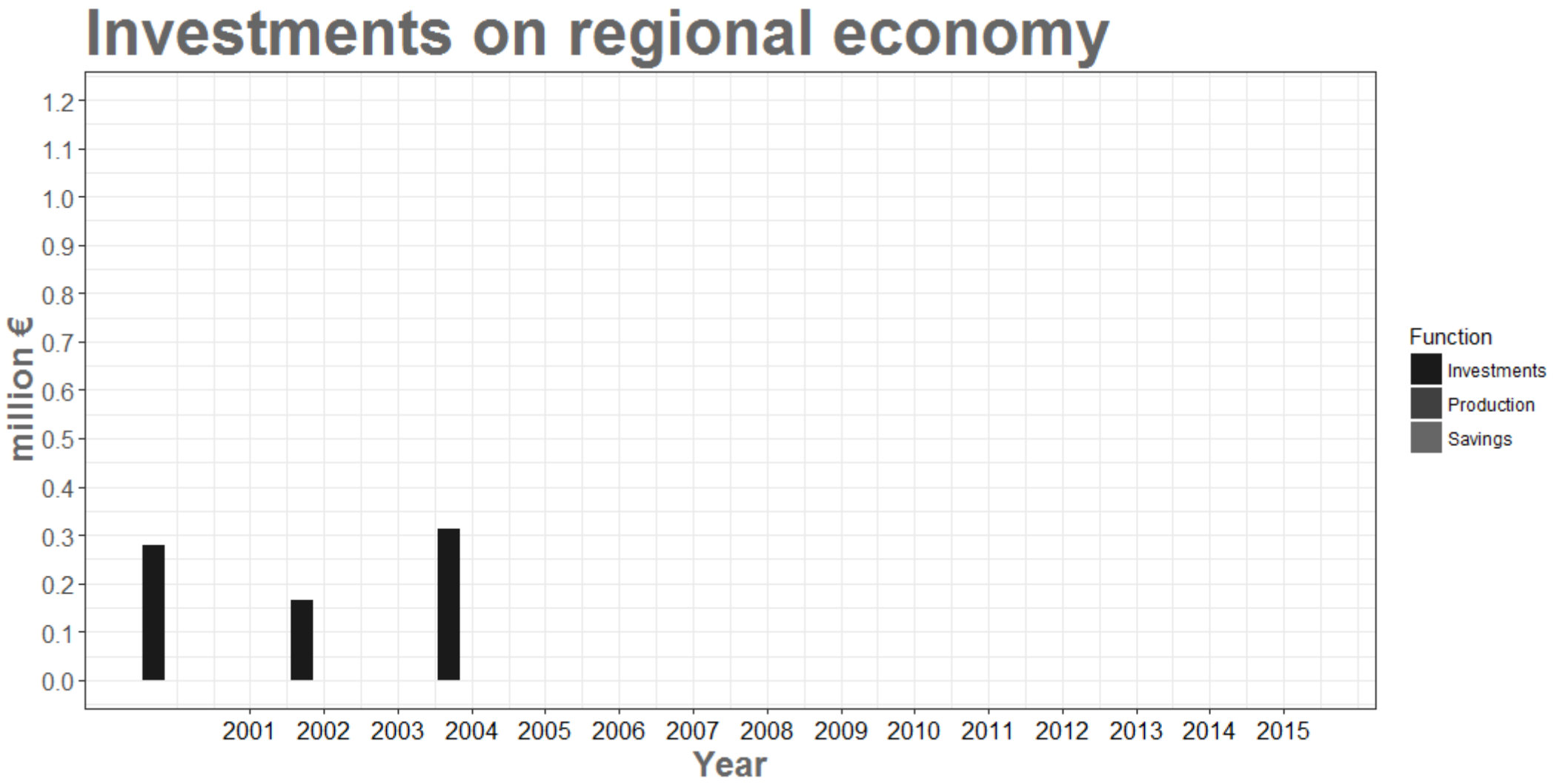
Commercial operation started: 2000
Owner: Eno Energy Cooperative
Boiler: 0,8 MW_{th}
Heated volume: 72 900 m³, the primary and secondary school buildings, library, sports hall buildings, church hall and six terraced houses.
Heat production: 3 800 MWh a year
Fuel consumption: aprx. 7 000 loose-m³ of woodchips

Bioenergy case: Eno energy cooperative

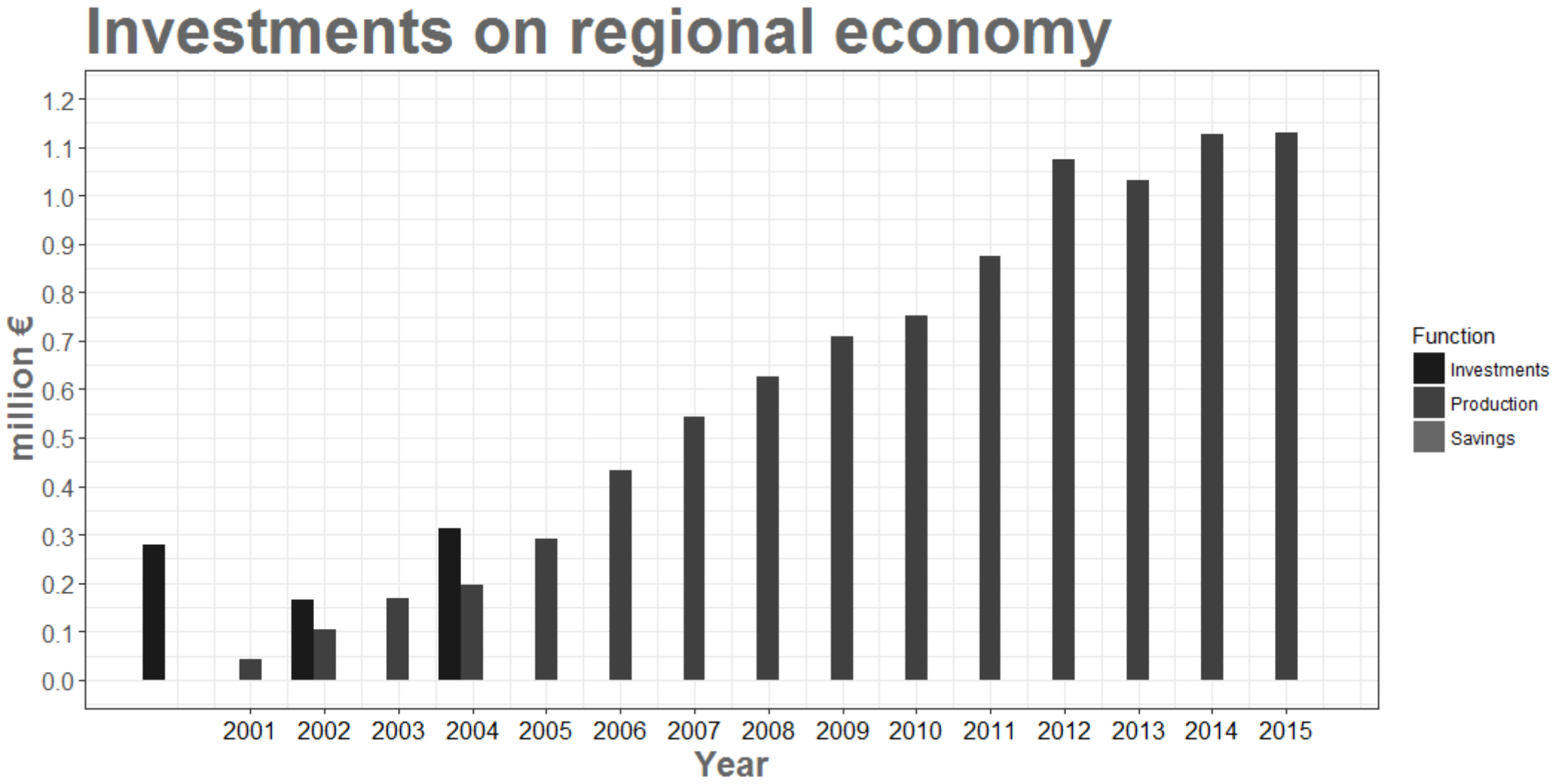


- Enon energy **cooperative** gave us detailed information about:
  1. Annual heat production 2001-2015,
  2. Annual heat production savings compared to heat produced with heating oil
  3. Consumers
- Reinvestment assumption: Households' share of the savings in reinvestment was spent on the commercial services and municipality's share was reinvested on the health services (to maintain local health center)
- Aim is to demonstrate the socioeconomic impacts that the bioenergy production and the potential savings provide for the regional economy.

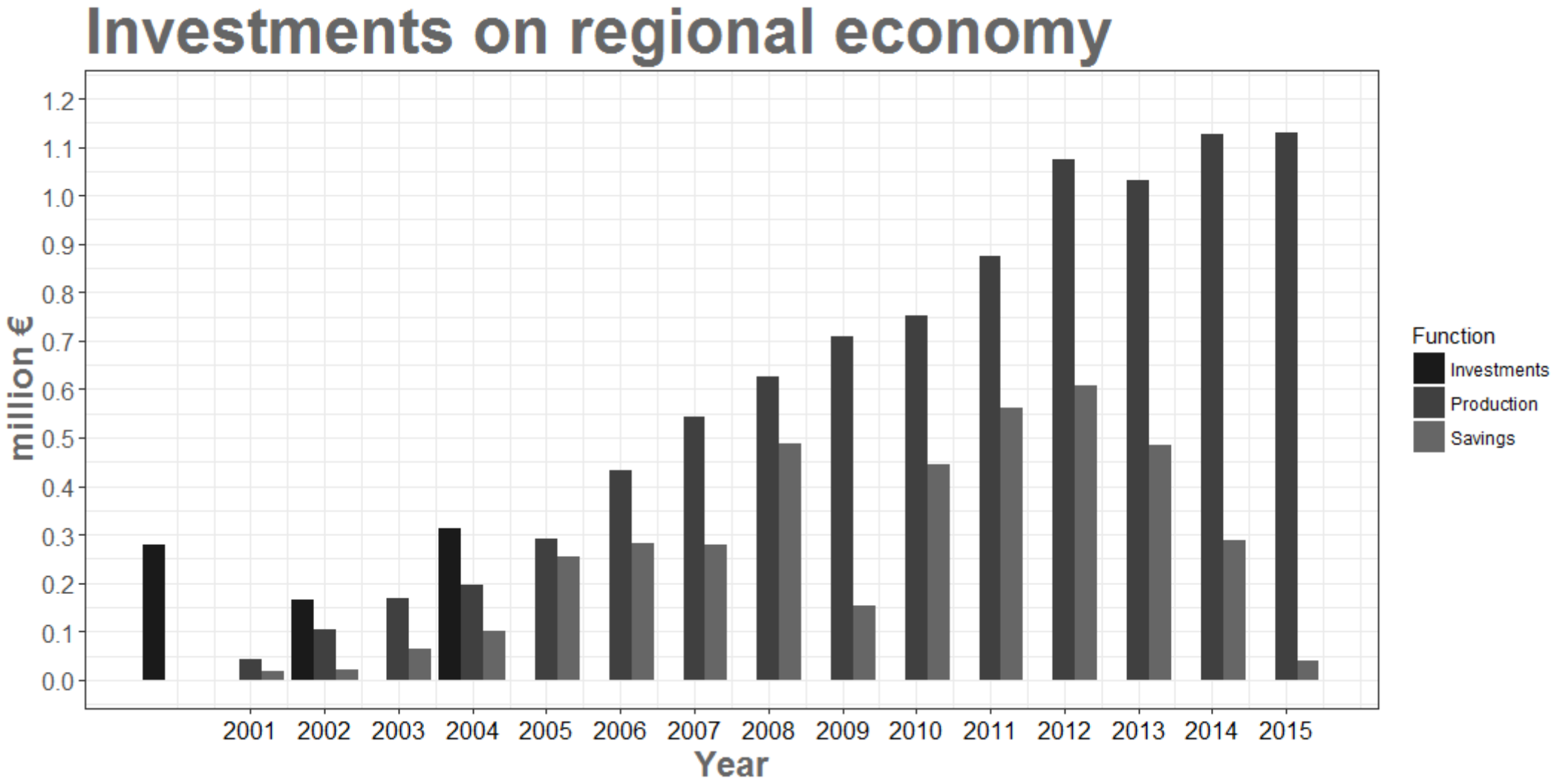
Assessment data 2001-2015



Assessment data 2001-2015



Assessment data 2001-2015



Modelling approach for regional socioeconomic impacts

$$x = (I - A)^{-1} y$$

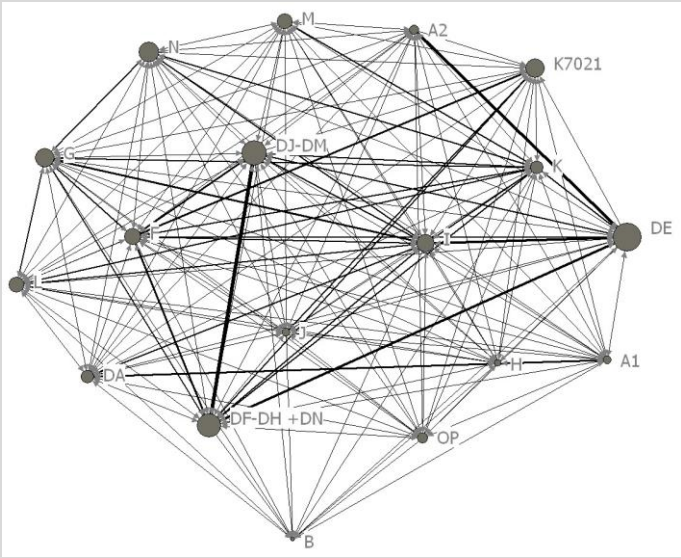
$$\bar{A} = \begin{bmatrix} A & h_c \\ h_i & h_{\cdot} \end{bmatrix} \Rightarrow x = (I - \bar{A})^{-1} y$$

Regional impacts are calculated with applied IO-model which was modified to include household consumption and price elasticities.

Input-Output Model	Name of the model in figures	Geographical Level of the input-ouput models	Number of Industries in input-output table	Type of Multipliers for assessing economic impacts	Source data
I	Pielinen18, Joensuu18	Local	18	type I	Regional input-output table localized with SLQ, CiLQ and FLQ
II	North Karelia 18	Regional	18	type I	Regional input-output table
III	North Karelia 26	Regional	26	type I	Regional input-output table
IV	Finland 26	National	26	type I	National input-output table
V	Finland 63	National	63	type I	National input-output table
VI	North Karelia 33	Regional	33	type II	Regional input-output table

Several research background materials were used for modifying the model for the purpose (Entrepreneur and capital incomes, income transfers between households, Statistics Finland; income transfers outside the households Social Insurance Institution of Finland; Finnish Forest Research Institute etc.)

In the model economy is described as a network:



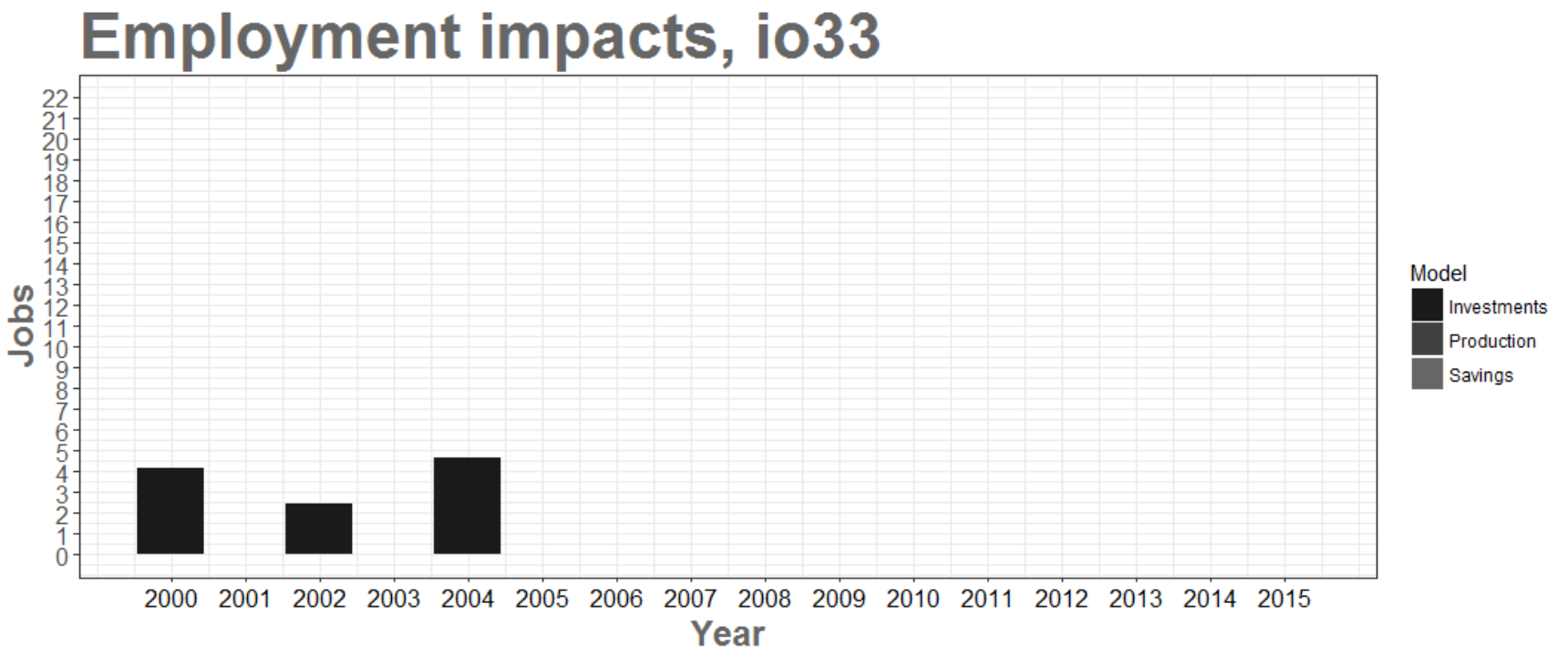
This one is used in this paper/presentation (include direct, indirect and induced impacts)

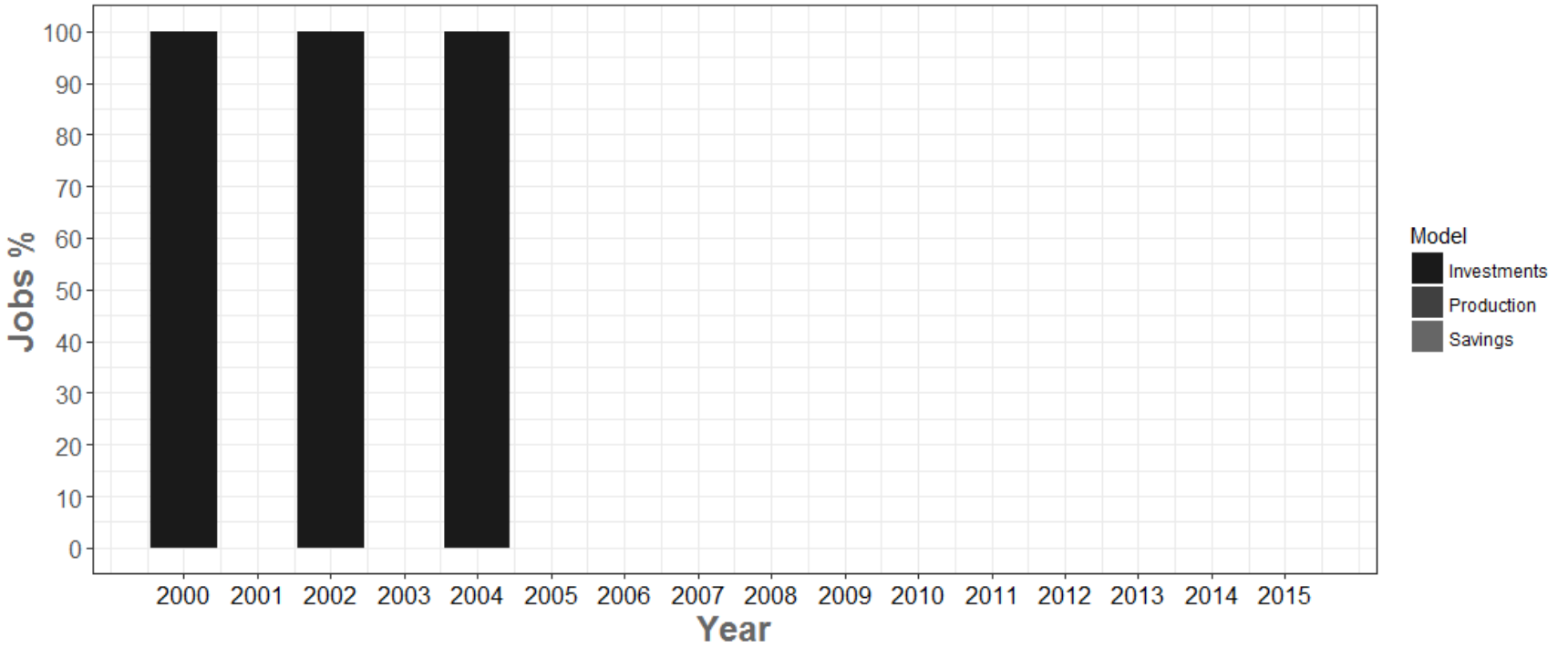
.

Results:

The employment impacts of the construction are relatively small because technology is coming outside the region.

The total employment impacts (direct, indirect and induced) from construction are 11 jobs.

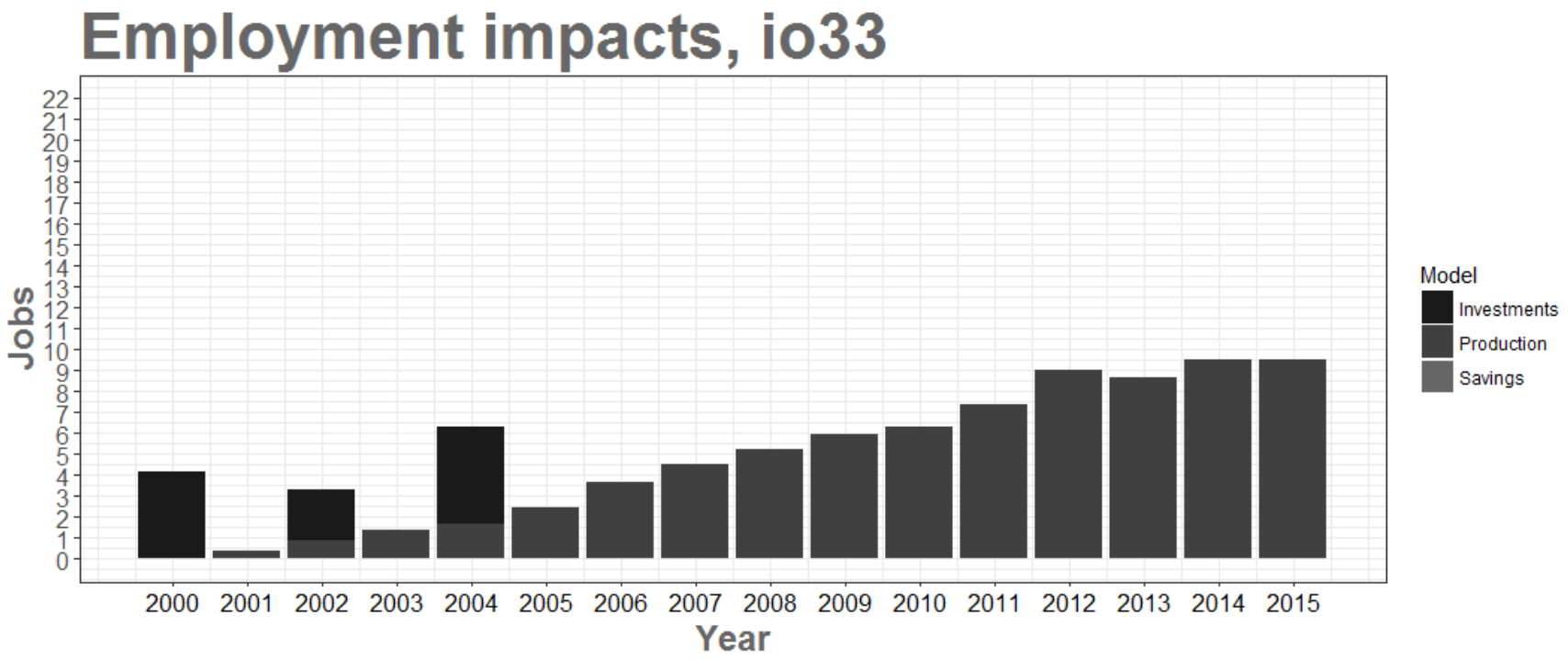


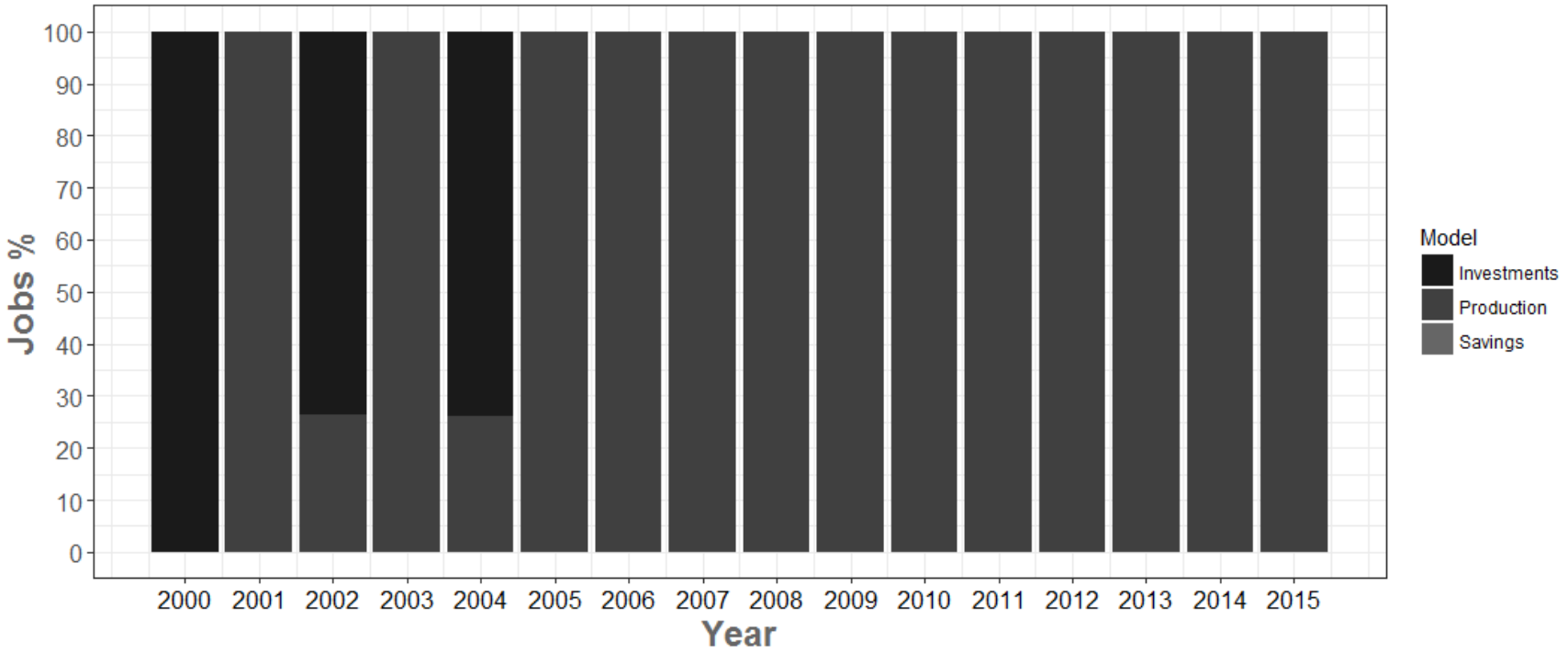


Results:

The employment impacts of the bioenergy production are higher than impacts from investments because woodchips used in heat production is from the region.

The total employment impacts of the bioenergy production from 2001 until 2015 are 76 jobs.



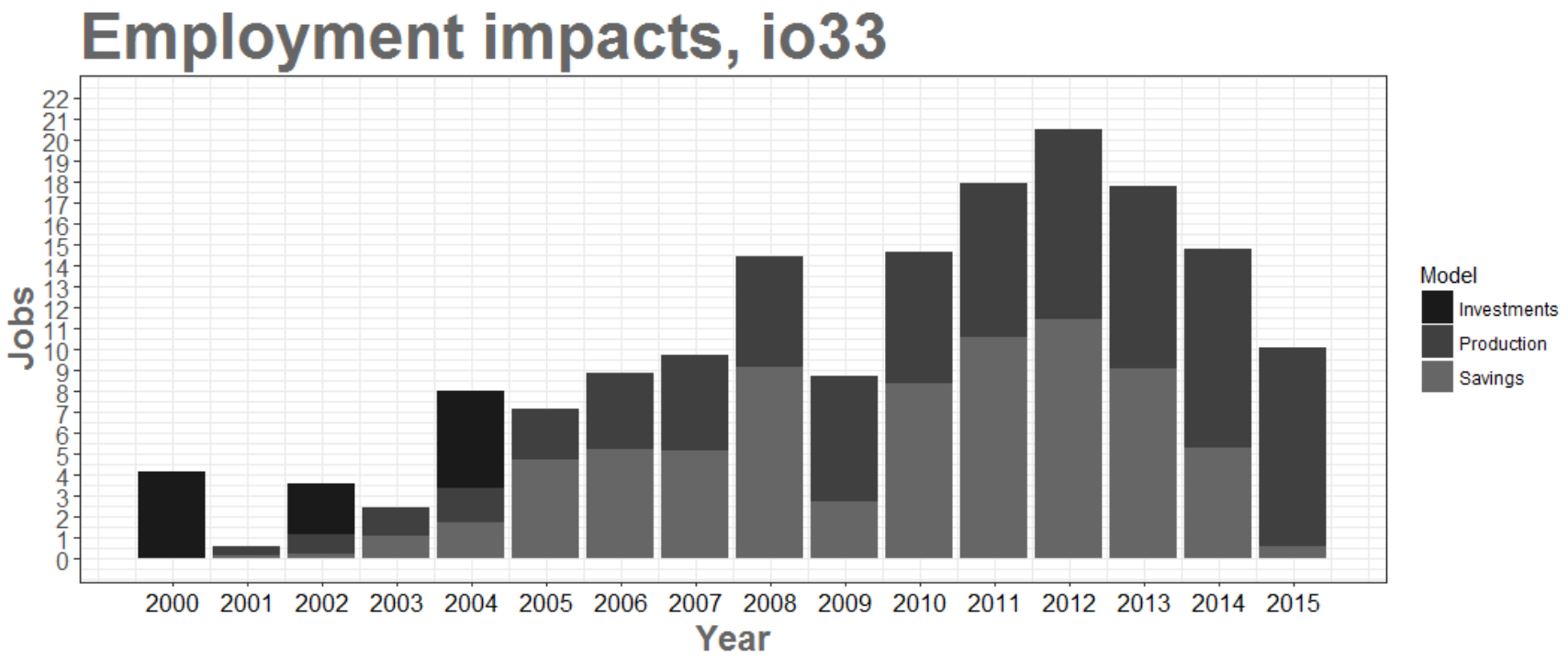


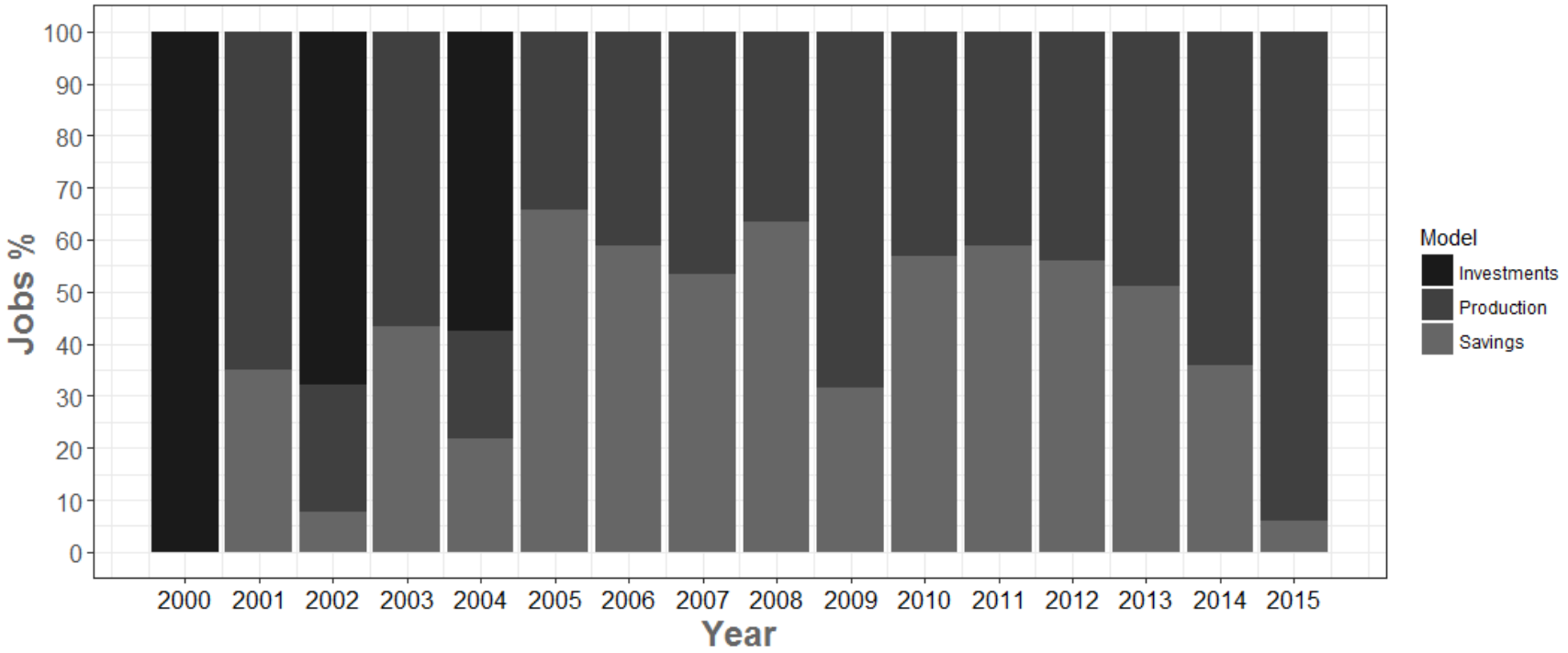
Results:

The total employment impacts of the savings from 2001 until 2015 are 75 jobs.

The impacts of the savings have doubled the socioeconomic impacts of the bioenergy production!

The total employment impacts are estimated to be **150 jobs**.





Findings (critical elements of success):

- The replacement of heating oil by local woodchips has brought considerable savings for bioenergy consumers from 2001 until 2015
  - When the savings from heating costs are reinvested on commercial and health care services, significant benefits for the regional economy will be achieved over a 15-year period: the total employment impacts are estimated to be 150 jobs.
- Success and the socio-economic benefits of heat production is maximised with
  a) **local business models creating common benefits (e.g. community-based businesses, social enterprises, and cooperatives),**
  b) **by utilising local biomass resources in sustainable ways without harming future material usage (e.g. use of thinning wood instead of round wood),**
  c) **by generating cost-savings for customers through reduced energy costs and**
  d) **re-investing the profits for identified local purposes (e.g. other community businesses).**
- At the local level the local decision-making and policy have also a key role

Thank you!

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Socio-economic impacts of a local bioenergy-based development strategy – The case of Pielinen Karelia, Finland

Olli Lehtonen [a], Lasse Okkonen [b, *]

[a] Natural Resources Institute Finland, Rural Policy and Research, Helsinki, Finland
[b] Karelia University of Applied Sciences, Energy and Environmental Technology, Joensuu, Finland

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ABSTRACT

The regional bioeconomy has great importance for generating socio-economic impacts, especially in sparsely populated resource peripheries. The benefits include increased employment and income and improved security of supply. In this study, the modified regional input–output model of North Karelia, Finland is applied for analysing the socio-economic impacts of a bioenergy-based local development strategy. The results indicate significant socio-economic benefits of a local development strategy based on bioenergy. This benefit is corroborated by approximately 12 million euros in annual income impacts and 280 personnel working years in the district. New stimuli in a currently declining municipality could potentially break negative path dependency. New bioenergy and bioeconomic developments are promising solutions for the construction of place-based regional development in resource peripheries.

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Local, regional and national level of the socioeconomic impacts of a bio-oil production system – A case in Lieksa, Finland

Lasse Okkonen[a,*], Olli Lehtonen[b]

[a] Karelia University of Applied Sciences, Finland
[b] Natural Resources Institute Finland, Finland

ARTICLE INFO

Keywords:
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Bio-oil production

ABSTRACT

The aim of this paper is to assess the direct and indirect socioeconomic impacts on a local, regional and national economy from forest biomass-based bio-oil production using input–output (I–O) analysis. We also analysed the importance of a bio-oil factory on the development of the local economy and determined the type of impacts bio-oil production has on population and employment development and on the public municipal economy. Our study area is located in a resource periphery far from growing regions and suffers from development problems and stagnating development trends. In terms of employment and income, bio-oil production could have a significant positive net impact on the local economy despite leakages to regional and national economies. The impacts of bio-oil production could enhance the future development prospects for the resource periphery according to positive changes in the net migration and by slowing population losses.

Renewable Energy

Volume 85, January 2016, Pages 826-833

Socio-economic impacts of community wind power projects in Northern Scotland

Lasse Okkonen [a], Olli Lehtonen [b]

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https://doi.org/10.1016/j.renene.2015.07.047

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Highlights

- We analyse the socioeconomic impacts of renewable energy on the community-level.
- We establish scenarios for the re-investment of revenues for social purposes.
- The results show the potential of renewable energy for place-based regional development.

Environment, Development and Sustainability

February 2013, Volume 15, Issue 1, pp 245–256 | Cite as

Regional socio-economic impacts of decentralised bioeconomy: a case of Suutela wooden village, Finland

Authors | Authors and affiliations

Olli Lehtonen, Lasse Okkonen

CASE STUDY
First Online: 25 July 2012

396 Downloads | 6 Citations

Abstract

The regional bioeconomy has a high importance for generating socio-economic impacts, especially in sparsely populated resource peripheries. The benefits include increased employment and income and improved security of supply. In this study, the modified regional input–output model is applied for analysing the socio-economic impacts of Suutela wooden village construction in North Karelia, Finland. The main objective of this article is to provide an illustrative example on the regional input–output modelling, applied to the investigation of the socio-economic impacts of a conventional, decentralised bioeconomy. Based on this Finnish case of a wooden village with bioenergy district heating, we demonstrate both the employment and income potentials of a decentralised bioeconomy. The results indicate good socio-economic

Engineering Earth pp 513-532 | Cite as

Potentials and Employment Impacts of Advanced Energy Production from Forest Residues in Sparsely Populated Areas

Authors | Authors and affiliations

Olli Lehtonen, Markku Tykkyläinen

Chapter
First Online: 30 December 2010

1 Citations | 101 Downloads

Abstract

This study elaborates on how the energy industries in sparsely-populated regions of Finland, in co-operation with the forest sector, could find substitutes for fossil and other imported fuels by producing energy, heating oil, and motor fuels from forest residues. The potentials for the combustion in energy plants, pellet production, the refining of pyrolysis oil and the refining of diesel fuel by Fischer-Tropsch synthesis are scrutinized in the framework of two alternative timber-cutting plans. Forest residues can efficiently replace fossil fuels in power and district heating plants given the current technology, but the refining of fuels would require further elaboration. The analysis shows that the employment impacts of energy production from forest residues would be geographically widespread and important for livelihoods in rural areas.