



# **The importance and sustainability of bioenergy in Finland and globally**

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# Background

- Finland is aiming for **carbon-neutral energy production**, where an essential part is **increased use of forest biomass**
  - This is a part of the **bioeconomy strategy** of Finland, as well as agreed at EU-level, as part of measures for carbon neutrality and increasing the use of renewable energy.
  - The **carbon neutrality or sustainability of forest biomass in energy use** has been under critical review
- Different stakeholders have used materials and data, from research of different scientific disciplines. These **either favour the increased use of forest biomass or are critically against it**. The materials are used for decision-making in Finnish governmental organizations, as well as different institutions in the European Union.
- The discussion has increased after the release of the **IPCC report 8.10.2018**
  - Professor Ollikainen, Helsinki University: "Now we can forget the biofuels from wood". → may be a one-sided, too general statement



# Objectives and methods

- A work group consisting of Jukka Konttinen (professor, D.Sc., TUT), professor Esa Vakkilainen (D.Sc., LUT)) and student Varpu Orasuo (TUT), decided to collect and investigate arguments, that are used pro and against bioenergy.
  - FINANCER: Finnish Flame Research Committee (FFRC) <http://www.ffrc.fi/>. Cooperation also included the project EL-TRAN <https://el-tran.fi/>
  - The results of the work were also reviewed by professor Pami Aalto of University of Tampere, Matti Rautanen of Valmet Technologies Oy and Ahti Fagerblom of Finnish Forest Industries Federation.
- As a form of Master's Thesis, six publications related with bioenergy were investigated and arguments were collected.
  - Some controversial arguments are analyzed more accurately and they are subjected to fact checking by comparing arguments against scientific literature.
  - Certain arguments were identified according to their preconditions, restrictions, and assumptions that can be used to modify the claims as desired.
  - Link to Master's Thesis of Varpu Orasuo: <https://dspace.cc.tut.fi/dpub/handle/123456789/26497> (In Finnish)



# Research questions

- What are the views, claims and opinions on Bioenergy? What are the most disagreed points? What are the big questions behind these views?
- What are the arguments, boundary conditions and initial values? Are the references correct?
- What is known from the arguments now?



# Analyzed articles

- Yle news "Goodbye kuukkelimetsä: Hakkuukiistat palasivat Suomeen, kun biotalous jauhaa puuta rahaksi" (Toivonen 2017),
- MustRead –net publication article "'Kauko-partiomiehiä ja maanpettureita' – Miksi metsien käytöstä taistellaan nyt Euroopassa ja kotona" (Säntti 2017),
- Europa and Asia BirdLife with Transport & Environment "The Black Book of Bioenergy-Good Intentions Gone Bad" (Aalto et al. 2016),
- Chatham House report "Woody Biomass for Power and Heat – Impacts on the Global Climate" (Brack 2017)
- Responses to Chatham House by:
  - IEA Bioenergy (Cowie et al. 2017)
  - World Bioenergy Association (2017).



# Methods and results

- The overall principle was to **follow objectivity according to the scientific method**, based on the logicality and truth value of the arguments, with no **need to comment which was the direction giving the argument or whether the direction is right or wrong**.
- The arguments are categorized according to the themes that are present in them. Categories include
  - land use,
  - amount of forests,
  - greenhouse gas emissions,
  - use of raw materials,
  - impacts on the local environment,
  - economic impacts
  - other arguments.



# Results

- The study finds that the authenticity of several bioenergy arguments is **dependent on the source data and the restrictions**. The arguments therefore **only take place in certain situations**.
  - Arguments can be justified, among others, by **looking at the situation over different time periods** or by **emphasizing** the maximization of **short-term or long-term climate benefits**.
- **Different values can be selected from initial data**, whereupon their **own argument can be confirmed**.
- The critical arguments against the use of bioenergy **may state the bioenergy usage as separate from other industries** or the arguments might **simplify**, for example, the **bioenergy feedstocks or end usages**.
- The arguments of **bioenergy defenders** often rely on the fact that the **use of bioenergy will replace the use of fossil fuels in the future**.



# Adequacy of forests

Forest use to bioenergy does not reduce forests

- Focus on long term change (~permanent change)
- View on large areas, **national/regional focus**
- Active forest management improves forest growth
- Focus on sustainable forests

VS.

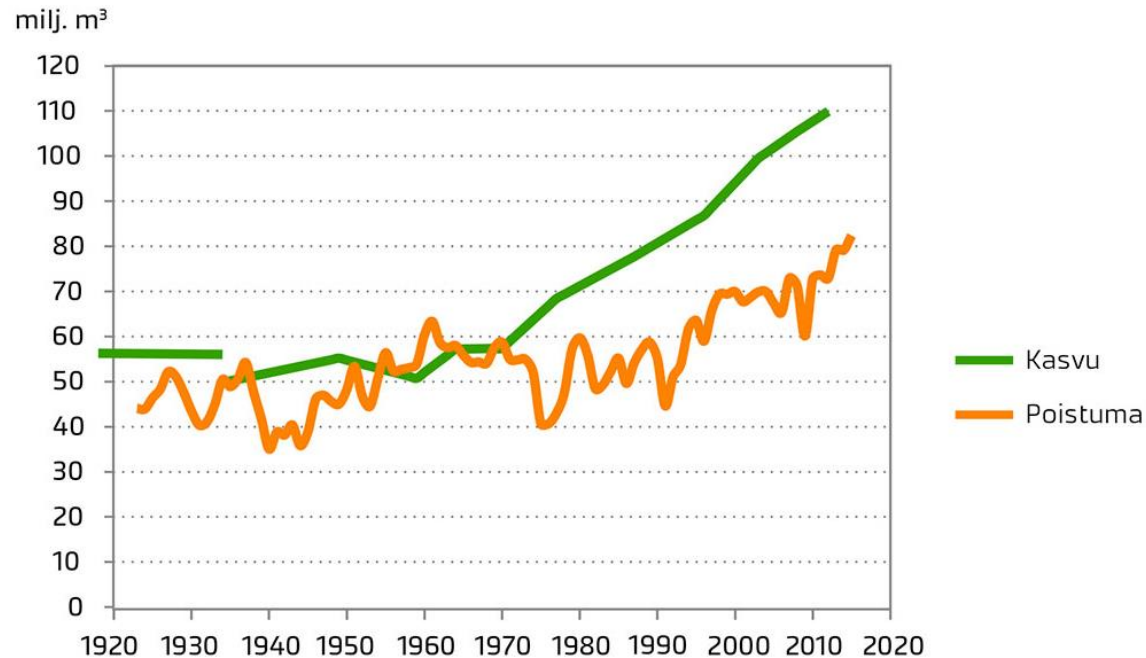
Forest use to bioenergy reduces forests

- Focus on short term (~now)
- **Using examples only from Northern coniferous forests**
- View on single tree/small cut area
- Short time scale; stress on need to look maximize carbon sinks fast
- Target is fast growth of carbon sinks





# Growth and removals from Finnish forests



# Forest carbon sinks

Use of forests for bioenergy can occur while the forests are used as carbon sinks

VS.

Use of forests for bioenergy will always reduce the carbon sinks

- Long term view
- When we look at large areas, **national/regional view**
- Active forestry increases positively to wood growth
- Aim to have sustainable forest use

- Short term view
- **If one looks at northern coniferous forests**
- If we look at small area or single tree
- Short time view to maximize short term carbon sink
- Aim to increase carbon sinks fast



# Role of climate change in bioenergy

**Use of Bioenergy reduces greenhouse gases**

- **When forest growth is larger than cuts**
- **Long term carbon balance**
- **Carbon in biomass is part of the natural cycle of carbon between atmosphere, plants and soil**

**VS.**

**Use of Bioenergy increases greenhouse gases**

- **Carbon emissions from combustion are larger than from fossil fuels**
- **Carbon emissions should be reduced fast**
- **All emissions from use of bioenergy are not currently reported nor counted**



# The origin of wood

- Wood can be used from a region where there
  - is net growth of carbon storage
  - Wood use and growth are in balance
  - exists high conservation areas
- Trade is not problematic
- Areas where wood use is not sustainable should be recognized
- Problems should be dealt politically at source and not by stopping all wood use everywhere

VS

- Wood can not be used from a region if
  - Biodiversity is not increasing
  - Old forests are not increasing
  - Conservation of forests is suggested
  - Where there is net carbon loss
- Trade brings problems
- Problems dealt by stopping all wood use everywhere



# What we do not talk about/What is left out

1. Role of agriculture, role of forest industry, role of other forest use on forest carbon sink, biodiversity and sustainability
2. Can we farm forest like we farm land
3. International agreements on forest protection and extent of nature preservation areas



# Public opinion – claims from the media

- **"Forests are cut down for energy production"**
  - The income to the forest owners come from the forest industries. Forest is not planted for energy.
  - It has been planned to use internal wood for energy (TEM energy and climate strategies v. 2030 - 2050)
- **"Combustion kills people"**
  - Is a serious problem in small scale poorly controlled combustion, such as in stoves and ovens. Especially in the developing countries where wood is burned for cooking.
  - The health risk from combustion particulates should absolutely not be underrated. But when it comes to the deadly effect, it becomes possible from incomplete combustion, causing shortage of human life for a couple of years. After extended exposure for those who already have a weaker health condition.
- **"The idea of biofuels from wood can now be forgotten"**
  - Waste wood or forest residues can be used as feedstocks, which are not suitable for other higher added value products.
  - The so called first generation biofuels generate lots of emissions. There might be some confusion or misunderstanding between different raw materials.
- **"Increase of loggings will cut our carbon sink by half"**
  - The GROWTH of carbon sink may temporarily be cut by half, as concluded by the Finnish Climate Change Panel



# Dissemination

- [Master's Thesis](#) of Varpu Orasuo
- [Bioenergiapäivä](#) Tampere, presentation 22.10.
- Liekki-päivä presentation, Dipoli, Espoo 23.10.
- Soon: Interview in newspaper Karjalainen
- Soon: Interview by web journal Mustread.fi (followed by Finnish decision makers)
- Presentation in [EUBCE 2019](#), spring 2019
- Press release? Has already been [published in Talouselämä](#) today (23.10.)



# CONCLUSIONS 1/2

- Background: Materials related with bioenergy, that are used for decision-making in Finnish governmental organizations, as well as different institutions in the European Union.
  - In addition, some claims collected from general discussion in the media
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- Objectives and methods: Arguments were collected and investigated, that are used for and against the use of bioenergy.
  - In the form of Master's Thesis (Varpu Orasuo TUT, supervisors Esa Vakkilainen (LUT) and Jukka Konttinen (TUT)). Link: <https://dspace.cc.tut.fi/dpub/handle/123456789/26497>
  - 6 essential reports and articles were selected
  - The overall principle was to **follow objectivity according to the scientific method**, based on the logicity and truth value of the arguments, with no **need to comment which was the direction giving the argument or whether the direction is right or wrong**.
  - Financing and cooperation: FFRC.fi sekä EL-TRAN.fi. Reviewers Pami Aalto (TaY), Matti Rautanen (Valmet Technologies) and Ahti Fagerblom (Finnish Forest Industries Fed.)



# Conclusions 2/2

- The study finds that the authenticity of several bioenergy arguments is **dependent on the source data and the restrictions**. The arguments therefore **only take place in certain situations**.
  - Arguments can be justified, among others, by **looking at the situation over different time periods** or by **emphasizing** the maximization of **short-term or long-term climate benefits**.
- **Different values can be selected from initial data**, whereupon their own argument can be confirmed.
- The critical arguments against the use of bioenergy **may state the bioenergy usage as separate from other industries** or the arguments might **simplify**, for example, the **bioenergy feedstocks or end usages**.
- The arguments of **bioenergy defenders** often rely on the fact that the **use of bioenergy will replace the use of fossil fuels in the future**.