

# Catch the Carbon – Climate Mitigation from Research to Practice

#CatchTheCarbon  
@mmm\_fi



# Catch the Carbon program supporting science based policy making

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# Carbon neutrality as an opportunity



Finland aims to be **carbon neutral by 2035** and the world's first fossil-free welfare society.

This requires significant measures to reduce emissions in the energy and transport sectors, but also **reduction of GHG emissions** and **strengthening of the carbon sinks and reservoirs** in the land use sector.

In our national **Climate Plan for Land Use Sector** we laid down a target of an **additional annual net impact of over 3 million tons** carbon dioxide equivalent by 2035 in the land use sector.

# Scientific research, better data and climate resilient practices



In 2020 the government decided to **invest €100M** for the following five years, and **Catch the Carbon program**, was established to coordinate this investment with the aim to:

1. Strengthen the **competence and knowledge base** related to climate actions in the land use sector, effective use of data and filling in the information gaps.
2. Support agricultural producers, forest owners, and other parties making land use decisions in developing and introducing new **climate change resilient practices**

The programme covers the **entire land use sector** and is composed of

a) thematic development projects, b) a data and information programme, c) practical support mechanisms, and d) a separate research and innovation programme.



# Broad focus with national features

In the Finnish land use sector, GHG emissions can be reduced especially in the **use of peatlands** and by preventing the **conversion of forests** into other types of land (forest loss).

**Carbon sequestration** in forests can be promoted by taking care of forest health and productivity and in agriculture with various farming management practices.

New approaches needed, but also an overall **opportunity to improve** sustainability in land use, taking in account all elements of sustainability as well as promoting biodiversity.





# Catch the Carbon in numbers

- **5 open calls** for project funding 2021 - 2023
- Altogether over **150 projects** funded, appr. €75M in total to date, duration 2021 - 2024
- **87 different actors** have received funding
- R&I programme **15 consortiums** with over **€16M funding**

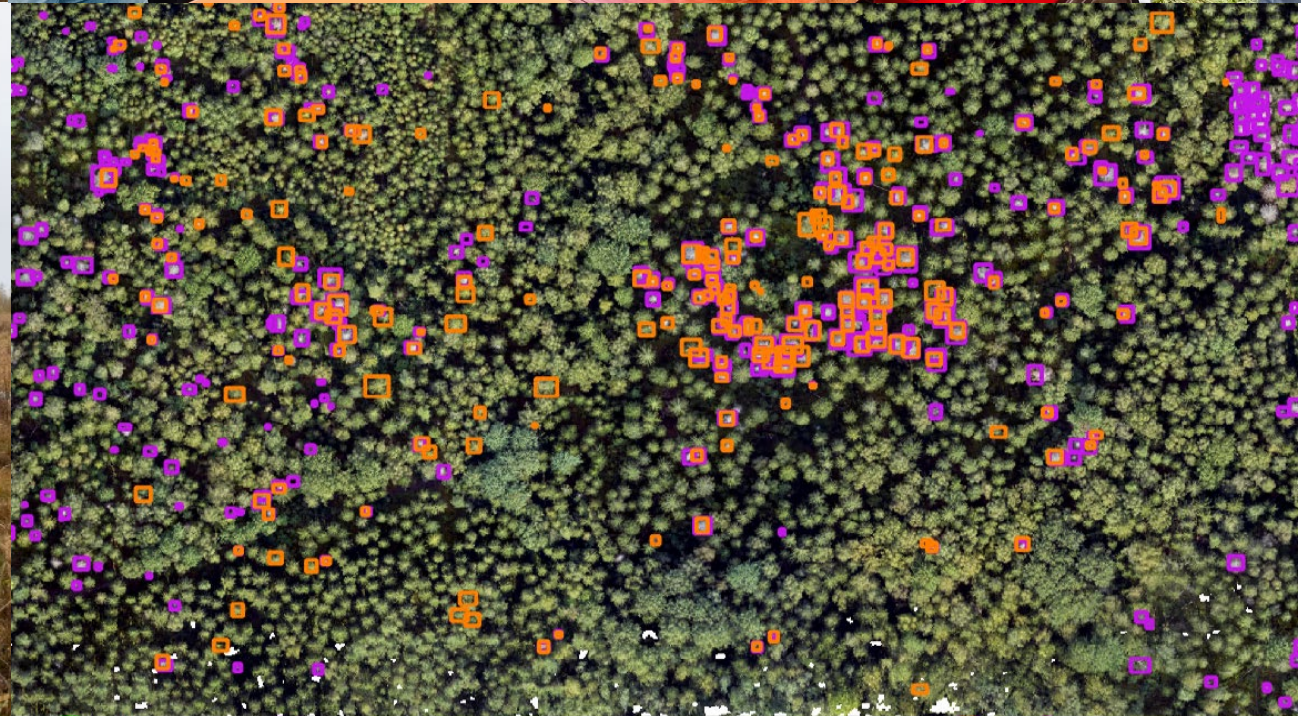
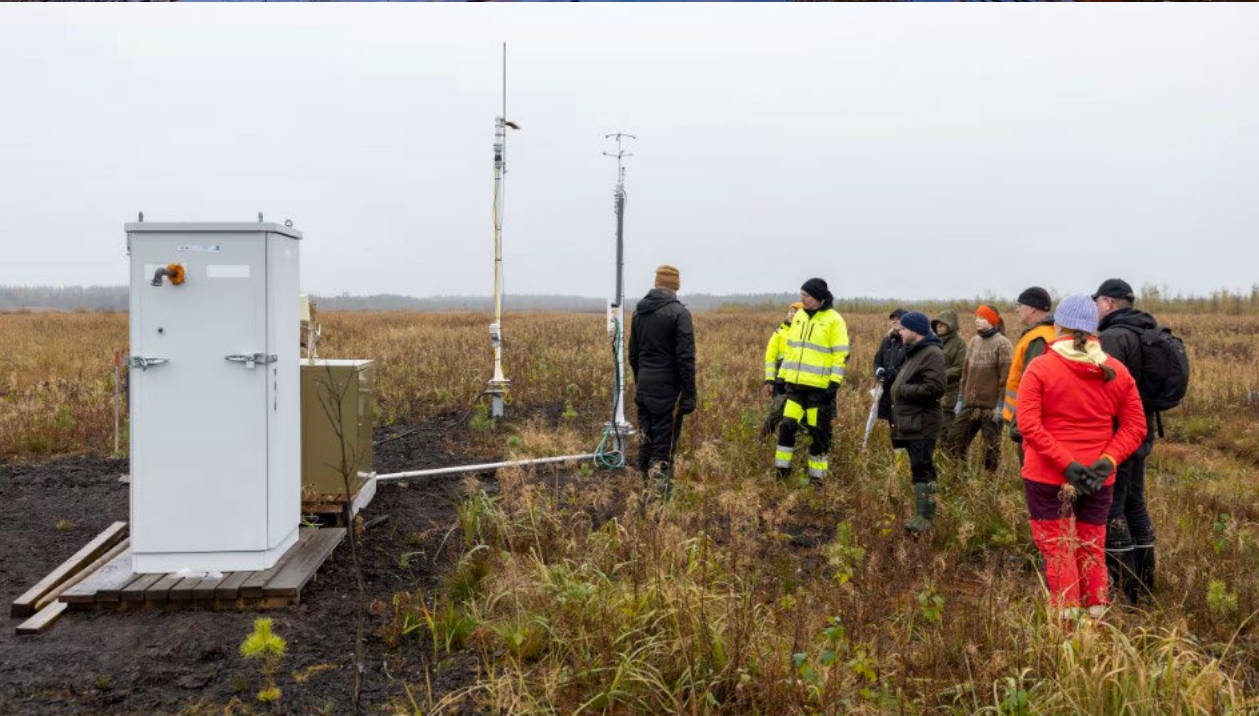
# Catch the Carbon research & innovation projects



- Carbon Sinks and Climate Benefits with Controlled Risks: Steering Mechanisms for Forests and Wood Products, HILMARI
  - Forests on Peatlands – Solutions for Mitigating Emissions and Increasing Carbon Sinks, TURNEE
  - Multi-purpose Forests of the Future and associated risks in a Changing Climate, FOSTER
  - **Wind, Forests, and Mires - Land Use Towards a Carbon-Neutral Society, LandUseZero**
  - Comprehensive Assessment of Climate Actions in Watersheds – Systems Analysis Towards Carbon-Neutral Land Use, SYSTEEMIHIILI
  - Opportunities for Municipalities to Use Net Carbon Sinks in the Land Use Sector for Compensation, KUNTANIELU
  - Carbon Balance and its Influencing Factors in Ash-Fertilized Peatland Forests, SUOHITU
  - Adaptive Mitigation: Collaborative Efforts in Forest Carbon Sequestration, HIILIPOLKU
- 
- Reducing Carbon Emissions from Peat Fields with Innovative Water Management, VESIHIISI
  - Dairy and Beef Industries in Finland: Progressing Pathways to Carbon-Neutrality by 2035, NC-GRASS
  - Disruptive Food Production Technologies as Part of Achieving Finland's Carbon Neutrality Goals, FOOD WITHOUT FIELDS
  - Farmland Processes as the Basis for Targeting Carbon Sequestration Measures, HIILETIN
  - Organic Side Streams into Sustainable Products through Digitalization, BIODIGI
  - Sphagnum Moss as a Climate-Smart Growth Medium – Opportunities for Sustainable Harvesting, RAHKOO
  - **Climate "nudge", or soft behavioral steers, as a tool to mitigate emissions in land use, TUIMA**

<https://mmm.fi/en/climate-plan-for-the-land-use-sector/research-and-innovation-programme>









# Forests on peatlands, TURNEE

- Significance of peat in carbon storage in the Finnish context
- Transformation of peatland into a carbon sink by afforestation in a single year
- Continuous monitoring with eddy covariance tower
- Emphasizing peatland restoration in policy





# Work continues: focus on impact

A preliminary **expert evaluation** of the development projects conducted

Final **synthesis of results** and **policy recommendations** in 2024, already

- New guidelines for best practices in sustainable forest management
- New and improved policy measures for our land use sector climate plan
- Work started to improve the accuracy of our GHG inventory

A **new National Climate unit** established

Hands-on work together with the actors and stakeholders

- **Catch the Carbon Community** - utilizing the collaborative power of actors involved!
- **Project and innovation accelerator** to boost new projects and applications

We are happy share with other countries our lessons learned!







## CarbonNudges in Climate Wise Land Use in Agriculture and Forestry

Research Director Olli-Pekka Ruuskanen  
Pellervo Economic Research & Strategic Research Council of Finland



Ministry of Agriculture and Forestry of Finland

# DIFFERENT INSTRUMENTS TO LOWER EMISSIONS

## Regulation

Mandatory regulatory tools to restrict or guide certain activities:

Prohibiting clearing new peat fields.

Prohibiting cultivating annual plants on peat soils.  
prohibitions or restrictions on the use of peat fields in agricultural production.

## Economic Control Measures

Guiding people through subsidies, taxes, and fees:

Land-use fee for clearing new peat fields or new fields and field clearings excluded from all agricultural subsidies for climate reasons.

Support instruments for draining, leaving uncultivated, afforesting, converting into wetlands or restoring peat fields.

## Information (Conscious)

Spreading information and promoting awareness:

Increasing knowledge about the environmental and climate effects of agricultural land use.

Collecting good practices and experiences from successful cases to support farmers in planning and decision-making.

## Nudging (Unconscious)

Guiding people to make favorable choices for themselves by modifying the environment and choice architecture.

Implementing nudges in conjunction with other control measures, possibly as complements.



# NUDGING FARMERS:TUIMA RESEARCH PROJECT



The TUIMA research project aims to reduce greenhouse gas emissions from land use and enhance carbon storage by applying nudging techniques to farmers and forest owners with peatlands.



Nudging influences decision-making without restricting choices, offering an alternative policy instrument to regulation and subsidies.



The projects co-developed nudges with the help of farmers and implemented these nudges by letters and by advice from extension workers.



The study employed randomized controlled trial and utilized social and commitment nudges to promote sustainable peatland usage.



The effectiveness of these nudges will be verified using subsequent farming data during spring 2024. The features of the operating environment, systems and other structures, as well as demographic and attitudes that affect the effectiveness of the nudge will be analyzed.

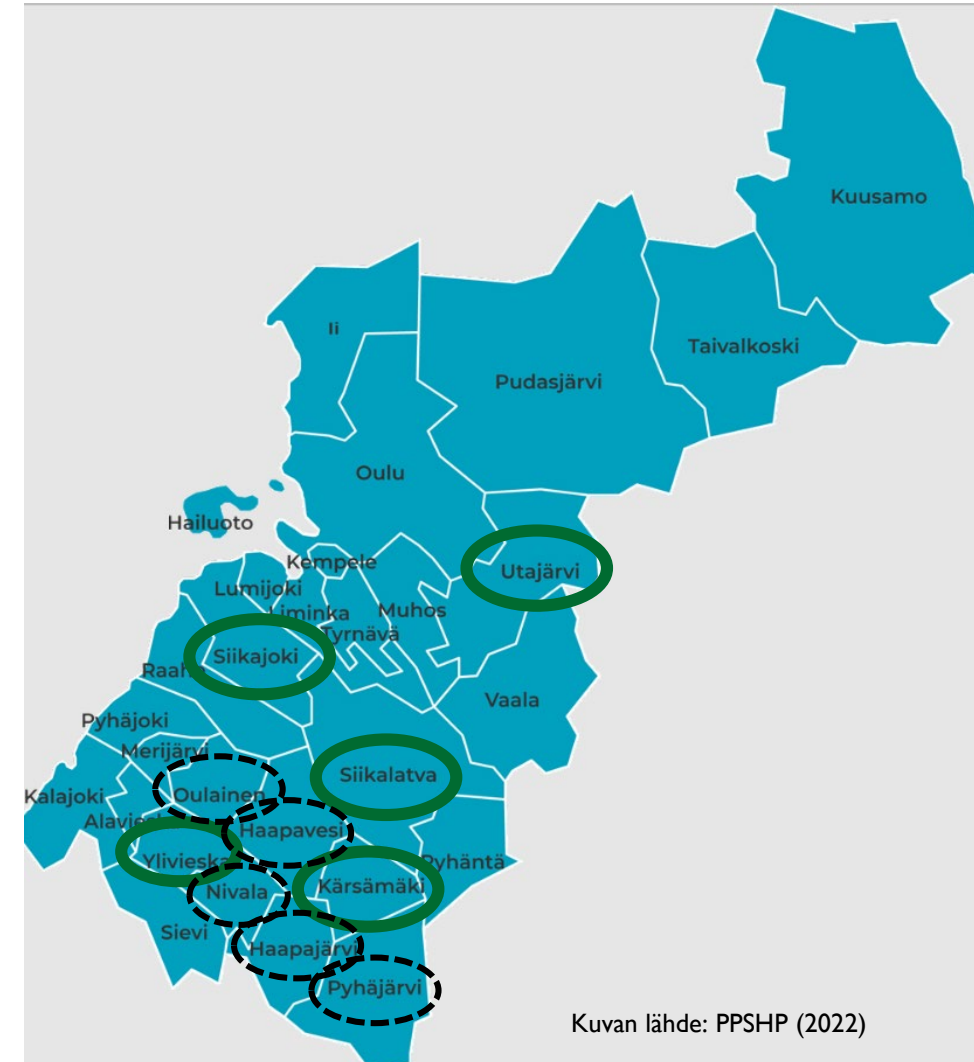


The effectiveness of nudges on vis-a-vis other policy instruments like subsidies and regulation will be assessed.

# MUNICIPALITIES WITH PEATLAND SELECTED

The experiment was conducted in 10 municipalities in Northern Ostrobothnia :

- **Selection criteria:** 1) Has over 100 active farms, 2) Peatlands consists over 10% of the farming area 3) Fodder grass cultivation in minor role.
- **Treatment and control municipalities** were selected by propensity score methods.
- Nudges were conducted in farms located in treatment municipalities, but not in the farms located in control municipalities.
- Two nudging letters + commitment option.





# NUDGING PEATLAND FARMERS

Identity letter: Climate-wise farmer

- Attempt of built positive proactive identity.

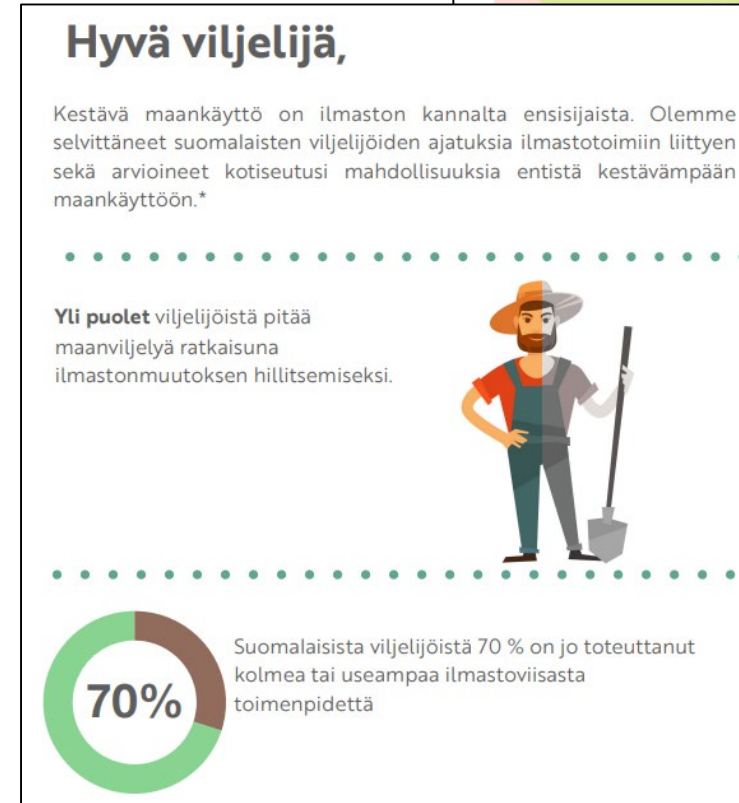
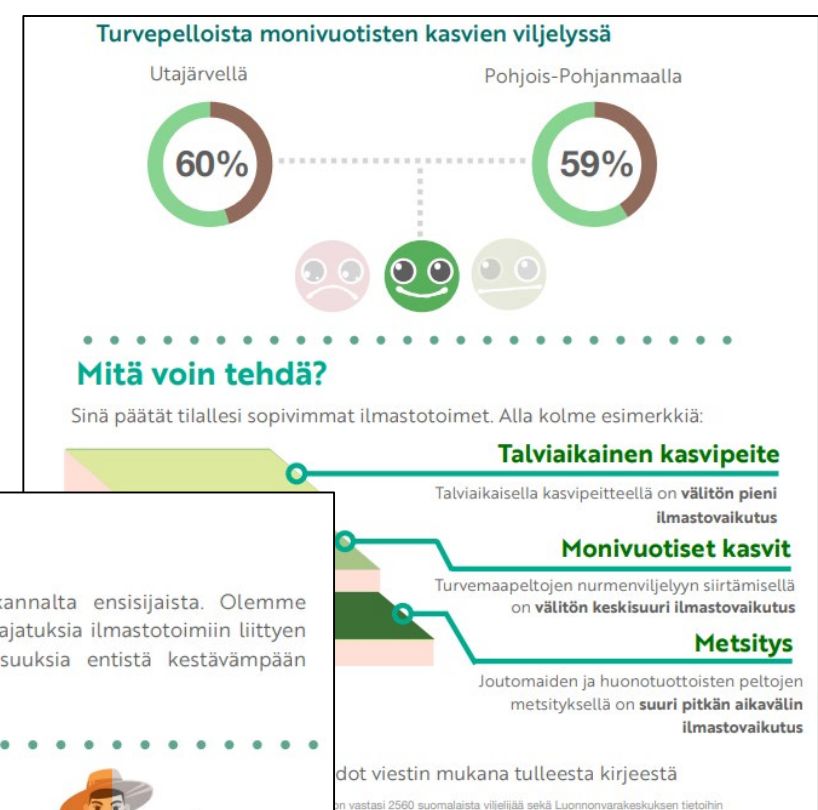
Comparison letter: What others do?

- Attempt to use social comparison to increase positive land use.

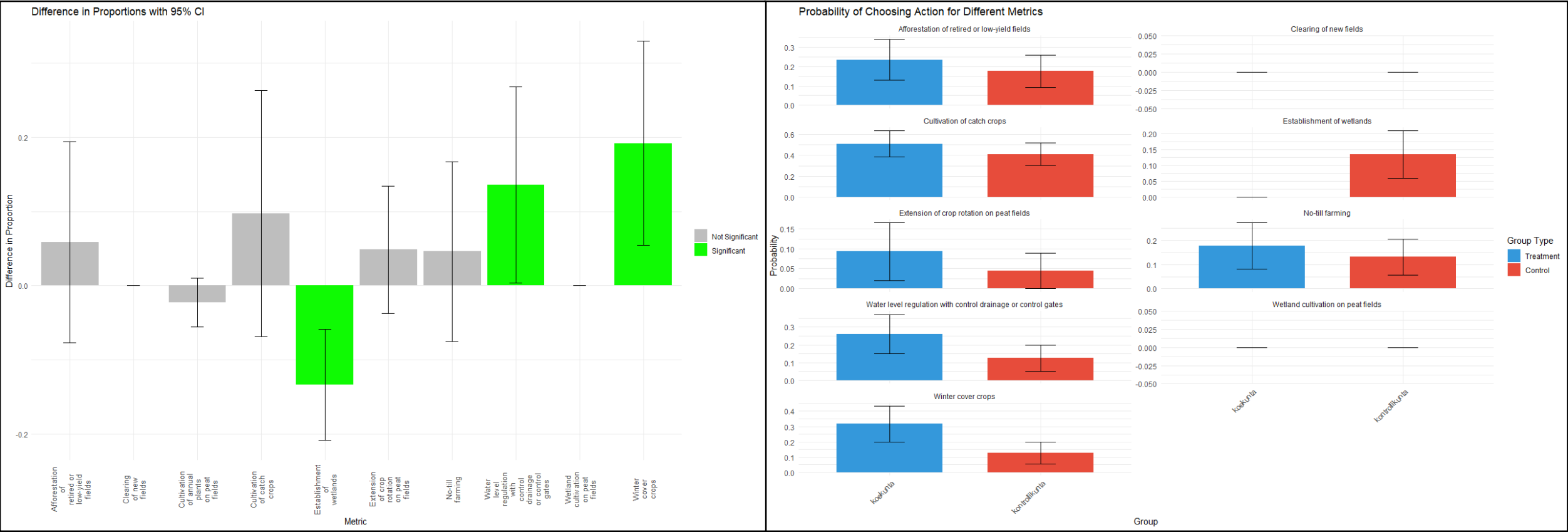
- Letters were sent in June 2022

Option to commit-nudge

- Suggested by extension service workers for season 2022-2023.



# NUDGES INFLUENCED ADOPTION



# OTHER PRELIMINARY RESULTS



Nudges had a positive effect on the adoption of lighter measures.

For example, logistic regression analysis resulted a statistically significant 3,24 odds ratio in **winter cover crops** in treatment group.

If a measure was difficult to implement, laborious and had significant economic consequences, nudging wasn't effective.

Small sample sizes complicate inference.



# RECOMMENDED STEPS IN POLICY INTERVENTION

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Assess the geographic location and potential in soil structure using spatial analysis.

Evaluate the characteristics of target groups like farmers.

Select the most suitable nudge given the both geographic and personal characteristics.

Introduce the nudge and complement it with other policy instruments.

Look not only to verbal commitments but actual land use.

Evaluate the impact and fine-tune the instruments.



# LandUseZero

## Wind, forests and peatlands - Transformation through land use to carbon neutral society

Anne Tolvanen

Professor, programme director

Natural Resources Institute Finland





# Comprehensive model of sustainable climate change mitigation options through land use

## Wind power, use of forests, use of peatlands

What is being done:

- Standardization of GHG impacts for the three land uses
- Predicting biodiversity impacts
- Citizen opinions towards land use policies
- Cost-efficient optimization of wind turbines





# Coarse estimates about the scale

- 1393 wind turbines in Finland, 7829 under planning or construction\*
- If 7829 turbines are built and basic restrictions (waters, protected, agriculture, cities, roads, border) are distracted from the planning area
  - 8% from remaining land area (now >1%)
- Presently: concentration to rural regions



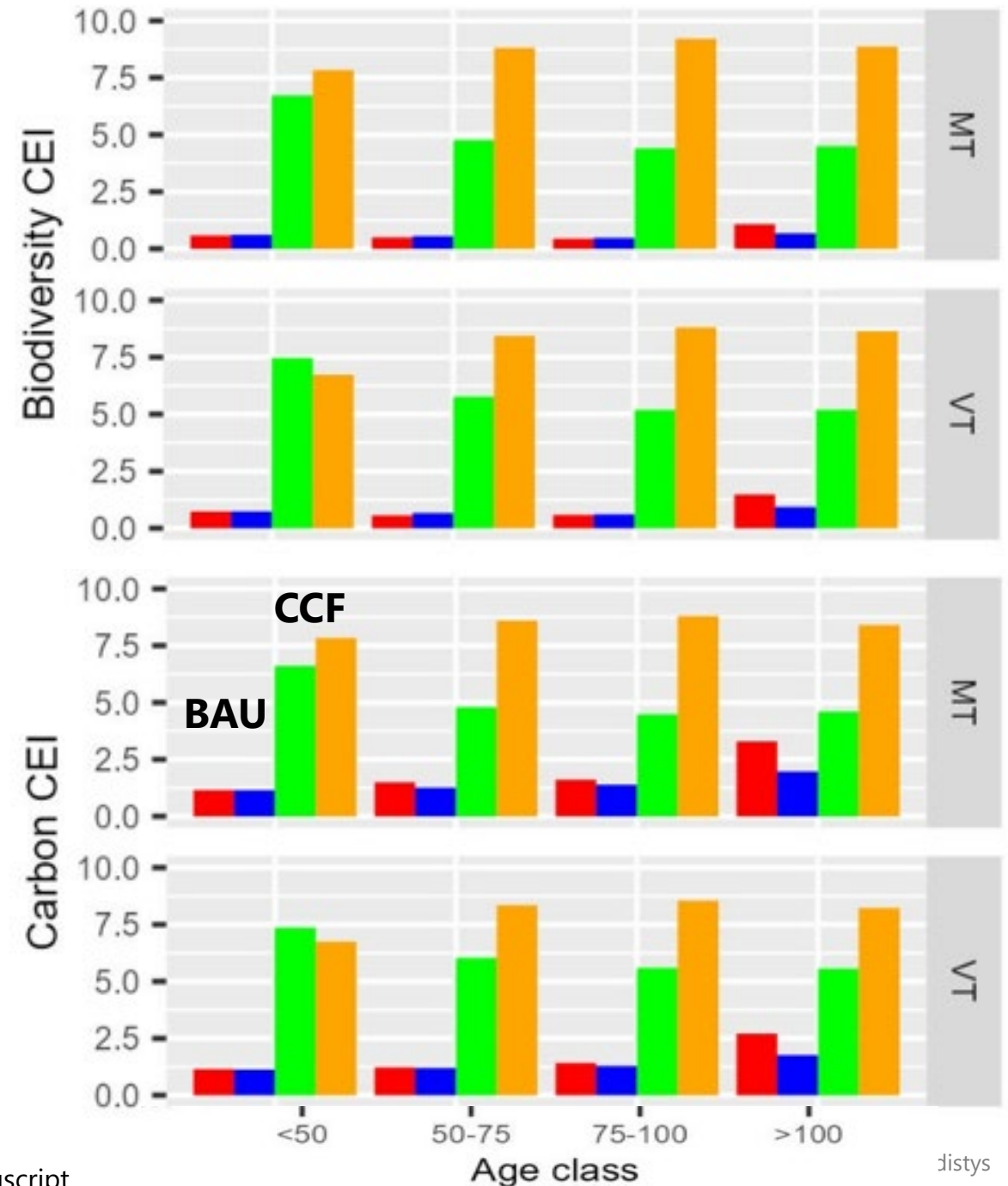
# Wind power: GHG and biodiversity

- Short-term climate benefit (Radiative forcing  $\text{W/m}^2$ )
    - Wind power reduces greenhouse gas emissions by replacing other energy sources
    - But, as the share of fossil fuels decreases, the emission reduction effects of wind power also decrease\*
  - Functional habitat loss for wildlife through displacement
    - distances of birds, bats and mammals range from 500 m to over 5000 m\*
- Distance thresholds for planning



# Climate-smart forestry

- Relative cost-efficiency index (CEI) calculated to evaluate the performance of forest management options
- Continuous cover forestry (CCF) is more cost-efficient to maintain carbon and biodiversity than is rotation forestry (BAU)\* → climate-smart forestry

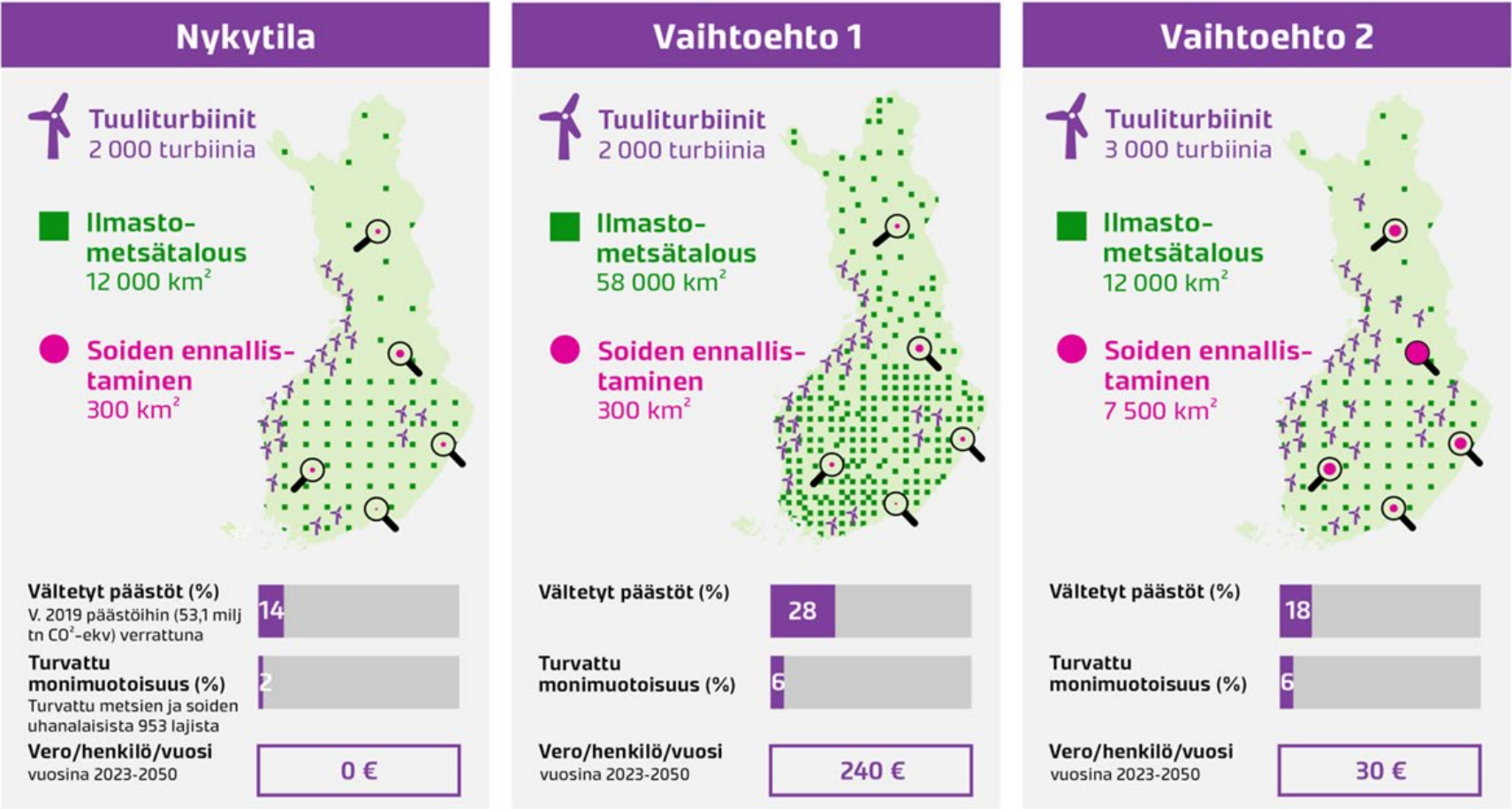




# Citizen opinions towards changes in land use policy (choice experiment, 2000 respondents)

- No. of wind turbines
- Area of climate smart forestry
- Area of peatland restoration
- % of avoided emissions
- % of protected species
- Eur annual taxes

## Choice situation



# Results: willingness to pay (WTP) for changes in policy

- WTP 60 – 300 eur /person/year
- Climate smart forestry and peatland restoration
  - Higher WTP for larger areas
- Protection of species and avoided emissions
  - Three times higher WTP for protecting species
- However, almost a third resists changes and requires compensation if the policy is changed



# Potential of forests to mitigate wind power impacts locally

## Noise

- Forest cover dilutes the turbine noise\*

## WTP of local *residents* to pay for maintaining the forest cover\*\*

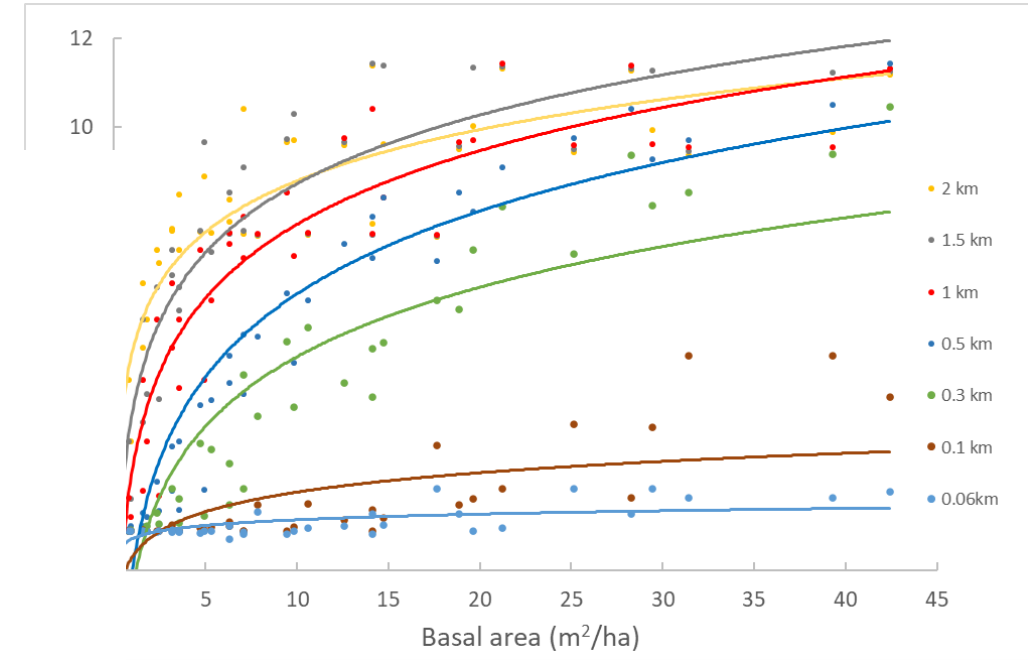
- 81 eur/ person / year

## Compensation request of forest *owners* to maintain the forest cover

- 298 eur / person / year

→ 4 residents needed per one forest owner for landscape value trade to happen

- At the moment, not enough payers






# Planning and policy recommendations

- Turbines should be placed at sites with low biodiversity
  - Distance thresholds provide new information on wildlife effects
- Forests should be left covered between local residences and wind turbines to protect from noise and landscape effects
  - Helps also some wildlife
- Compensation of the functional habitat loss caused by wind power should be done using protection and restoration
  - Wind power companies? → acceptance increases?
- Compensation mechanisms should be developed for forest owners to maintain the forest cover near residence
  - Not enough payers now, but when turbines are placed closer to the residents, landscape trade may become more attractive
- Comprehensive and long-term (life-cycle) evaluation is needed to optimize the various means to mitigate climate change





# Catch the carbon

CLIMATE SOLUTIONS IN  
THE LAND USE SECTOR

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