Green electricity products in the United Kingdom, Germany and Finland

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Green electricity markets in the United Kingdom, Germany and Finland

- Liberalized electricity markets
  - Customers can choose electricity supplier and product according to their preferences
  - Suppliers are not only competing on price anymore

- Wide variety of electricity products marketed as environmentally friendly *(voluntary green electricity products)*
  - Typically cost more than standard electricity but are claimed to offer environmental benefits
  - Problems may arise in the interface between renewable energy policies and voluntary green electricity markets
    - Do green electricity products really provide additional benefits above legally set obligations?

Research questions

- What impacts can green energy provide through green electricity markets and through local production (case study of Finland)?
- How has the demand for voluntary green electricity products developed?
  - Which factors affect consumer behavior?
- How much does the green electricity cost compared to standard electricity?
  - How wide is the range of price premiums?
- What socioeconomic impacts can local renewable energy production have?
- Which policies can be used to support local renewable energy production?

Definition of green electricity is not always clear, variety of products is wide

- Typically means that the electricity is at least partly generated by renewable energy sources
  - Claimed to increase renewable energy production and demand for new capacity
- Products can also promise other environmental benefits
  - Carbon offset: buying emission reductions elsewhere
  - Green funds: funding research, small-scale renewable energy projects, energy efficiency improvements…
- Differences in the effectiveness and transparency of green energy products

Electricity production from renewable sources is already regulated by policies

- EU has set binding targets for the share of renewable energy in gross final consumption *(Directive 2009/28/EC)*
  - The share of renewables should be 15% in the UK, 18% in Germany and 38% in Finland by 2020
    - No sectoral targets but electricity has significant contribution to the total energy target
  - National level: different ways to encourage the use of electricity from renewable sources
    - Support schemes: feed-in tariffs, investment subsidies, tax exemptions (Germany, Finland, UK)
    - Obligations to suppliers to include renewable electricity in the electricity mix (UK)

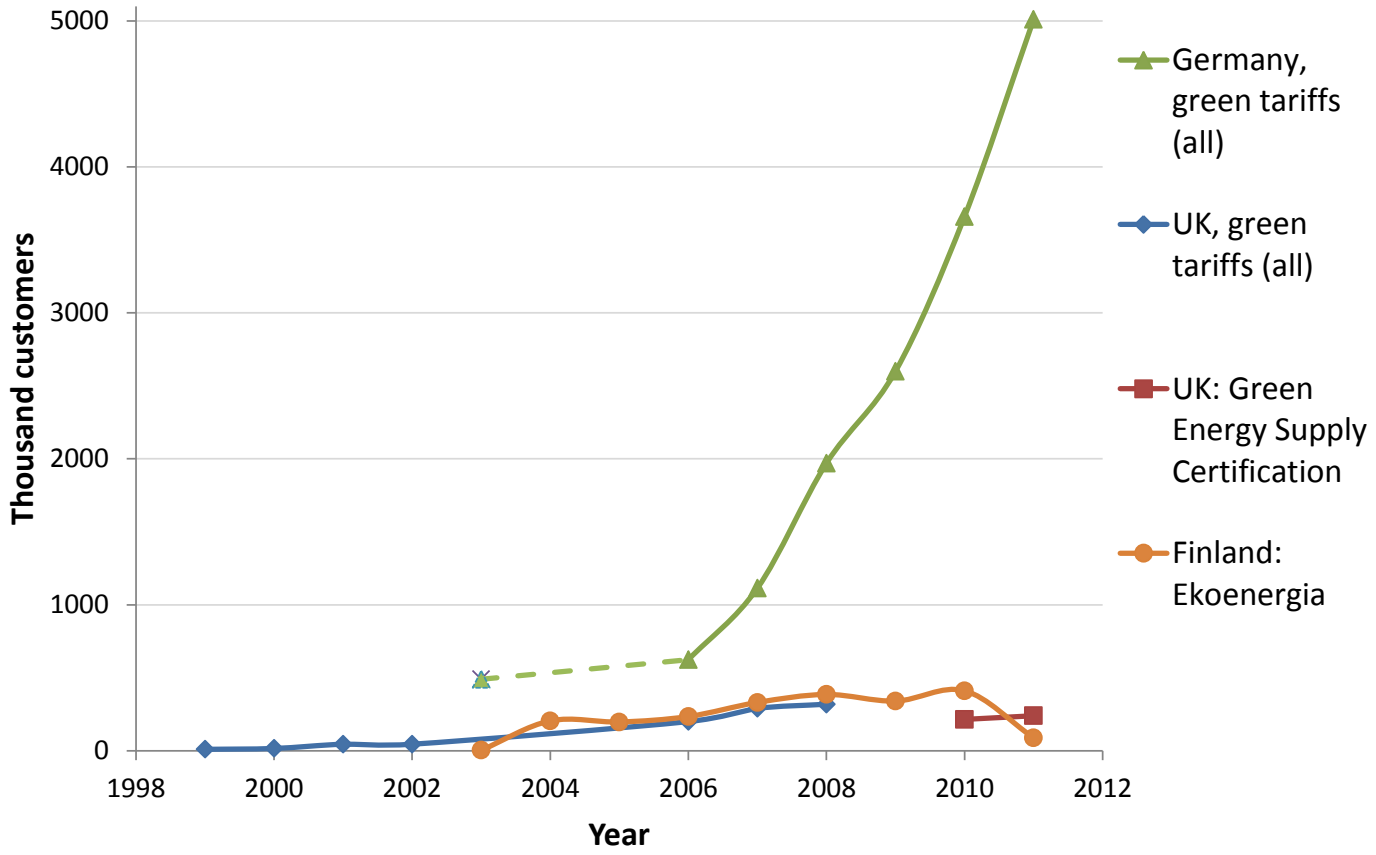
Problems may arise in the interface between voluntary green electricity markets and renewable energy policies

- Risks of double counting
  - Some suppliers may aim only to meet binding targets with voluntary green energy products
    - Required renewable energy is assigned to green electricity customers

- Some products include very high share of large hydropower
  - Green electricity from existing plants is not likely to create new renewable energy capacity

Number of green electricity customers varies between countries…

Population: UK 63 million, Germany 82 million and Finland 5.4 million

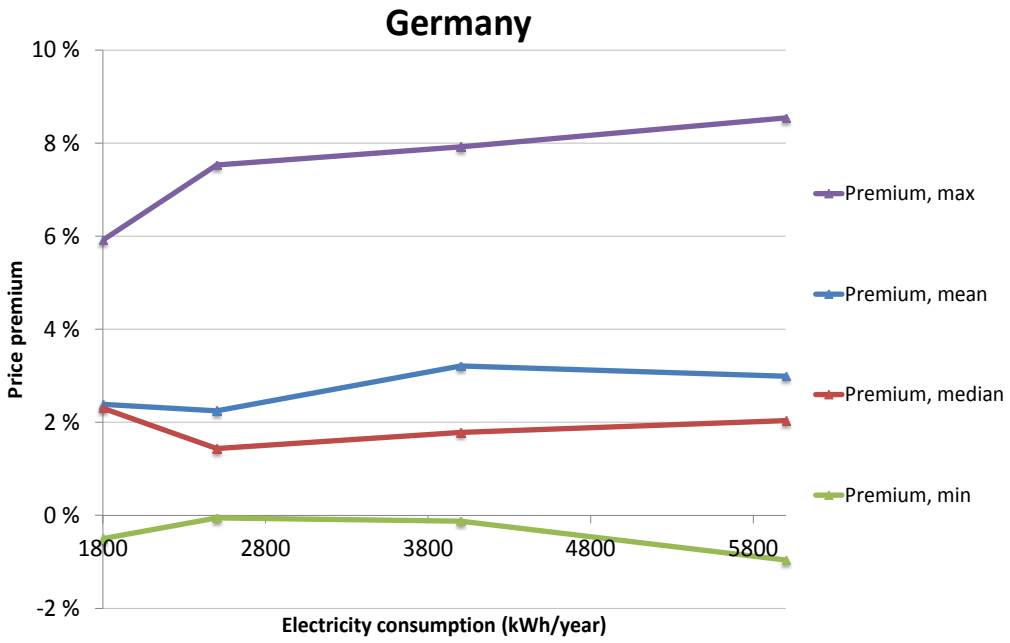


…and several factors influence the demand

- According to studies, consumer behavior is influenced for example by
  - Household characteristics like income and education
  - Environmental attitudes
  - Knowledge about electricity markets and existing electricity production structure
- Stated willingness to pay for green electricity is typically higher than actual participation
- Several possible barriers to buying green electricity are mentioned in the literature
  - Consumer confusion, lack of trust and knowledge, old habits and need for effort in order to buy green electricity…

Green electricity usually costs slightly more than standard electricity

- Yet, price premiums depend on several factors like electricity consumption, region and other properties of the product
  - Typically premiums are less than 5%, though the range is wide
  - Green electricity can also be cheaper than standard electricity



Renewable energy production can be encouraged by local policies (case study of Finland and literature)

- Local governments can set targets and regulatory schemes, provide financial incentives and guidance related to renewable energy deployment
  - Policies should be chosen so that they take local conditions into consideration
    - Local resources, traditions, experience and knowledge can have important role
  - Strong leadership and bringing different stakeholders together is important
    - Cooperation between different stakeholders is also important

Renewable energy production can bring several socioeconomic benefits (case study of Finland and literature)

- Local renewable energy production can have direct and indirect impacts:
  - Create local jobs, bring income and diversify the sources of income
  - Secure the local energy supply
  - Save money for example by offering alternative to expensive fossil oil
  - Support climate goals, promote sustainable urban development
  - Despite benefits, renewable energy cannot solve all socioeconomic problems of the area
- Case study shows that local renewable energy technology markets may proceed more easily than renewable electricity markets

Conclusions

- Green electricity costs on average 0-5% more than standard electricity
  - No significant differences between countries
  - Price premium depends on many factors like electricity consumption and region
- Demand for green electricity products varies between countries
  - Several factors and barriers influencing consumer behavior are identified in the literature
- Renewable energy can generate local socioeconomic benefits like job creation and money savings
- Local policies can help to develop renewable energy production

Thank you for your attention!

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Backup slides

Green electricity markets in the United Kingdom, Germany and Finland

- Liberalized electricity markets
  - Customers can choose electricity supplier and product according to their preferences
  - Suppliers are not only competing on price anymore

- Wide variety of electricity products marketed as environmentally friendly *(voluntary green electricity products)*
  - Many types of mechanisms to produce environmental benefits, differences in transparency
  - Labels, assessed by third party, available for green electricity products

Research questions

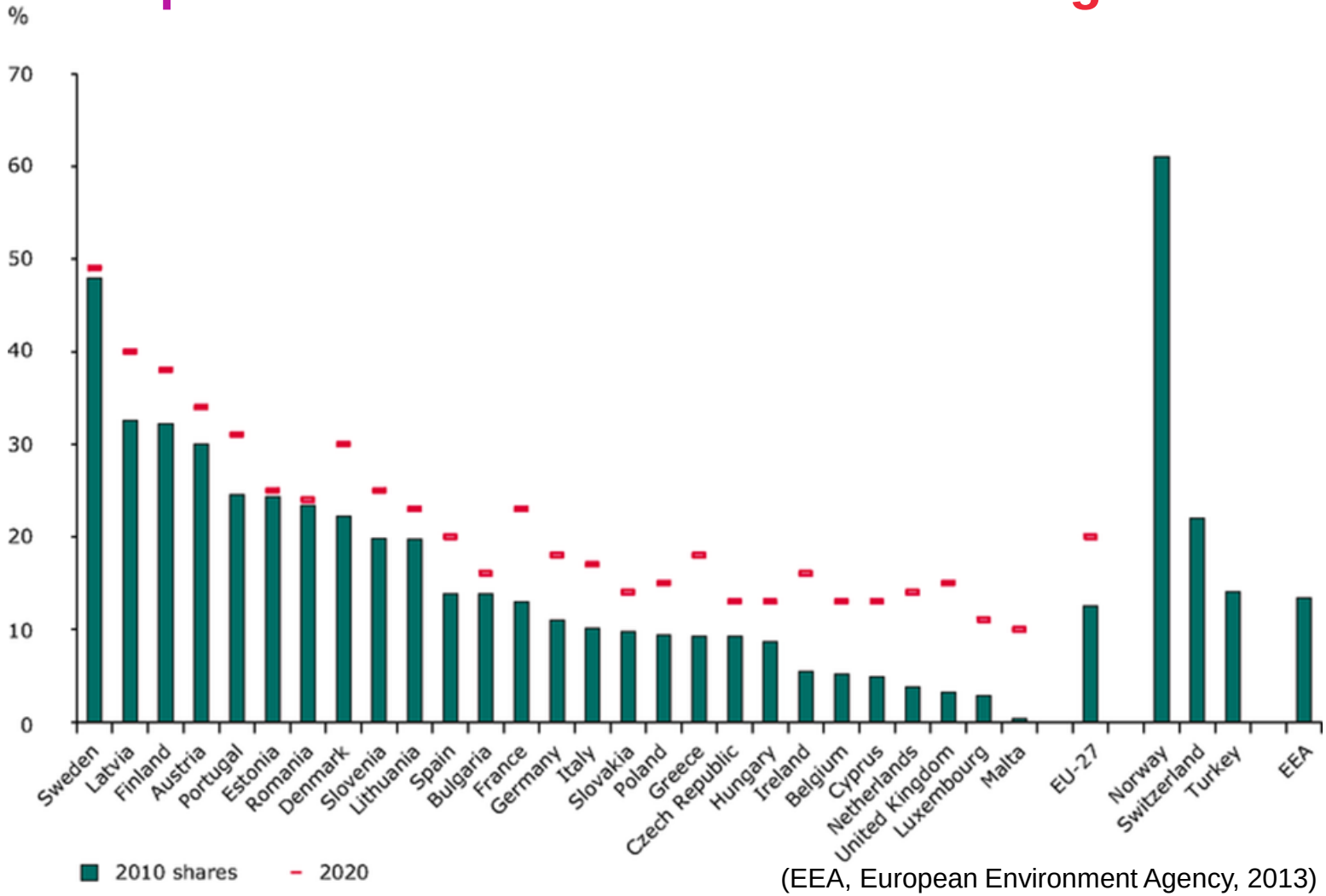
- **Our study focuses on the green electricity markets in three EU countries**
  - What kind of problems may arise in the interface between renewable energy policies and voluntary green electricity markets?
    - Do green electricity products really provide additional benefits above legally set obligations?
  - What kind of green electricity products are available for household customers?
    - What kind of environmental benefits are promised?
    - What mechanisms are included to provide benefits?
    - What kind of requirements do green electricity labels have?
  - What kind of social and economic impacts can green energy have? (Case study: Eastern Finland)

Renewable energy policies: EU and national level (1/2)

- The climate and energy policies of EU influence the policies of Member States e.g., through directives
  - EU directives are legislative acts that set out goals that EU Member States have to achieve
  - Member States have to adapt their laws to meet the goals of directives but are free to choose the means to achieve the goals

- **EU has set binding targets for the share of renewable energy in gross final consumption** *(Directive 2009/28/EC)*
  - The share of renewables should be 15% in the UK, 18% in Germany and 38% in Finland by 2020
    - No sectoral targets but electricity has significant contribution to the total energy target
  - **National level**: different ways to encourage the use of electricity from renewable sources
    - Support schemes: feed-in tariffs, investment subsidies, tax exemptions (Germany, Finland, UK)
    - Obligations to suppliers to include renewable electricity in the electricity mix (UK)

Share of renewable energy to final energy consumption: 2010 shares and the 2020 targets



(EEA, European Environment Agency, 2013)

Renewable energy policies: EU and national level (2/2)

- Member States have to provide system of **Guarantees of Origin** so that producers can prove the origin of renewable energy *(Directive 2001/77/EC)*
  - Voluntary system for the producers but can be utilized in the labeling schemes to verify origin of renewable energy

- Suppliers have to provide customers with information on the sources from which their electricity is generated *(Directive 2003/54/EC)*
  - Requirement implemented in different ways in Member States
    - In some countries it is possible that supplier provides information only about the total electricity mix and include differentiated products (like green electricity) in it

Voluntary green electricity products (1/2)

- Definition of green electricity is not always clear, variety of products is wide
  - Typically means that the electricity is at least partly generated by renewable energy sources
  - Products can also promise other environmental benefits

(http://blog.testsieger.de/2011/03/oekostrom-anbieter-vergleich/)

(http://www.oekostrom-vergleichen.de/)

Voluntary green electricity products (2/2)

- Different mechanisms to provide environmental benefits
  - Differences in how and where energy is produced
    - Is large hydro included?
    - Is renewable electricity imported?
  - Other kinds of environmental benefits can be provided in several ways
    - Investments in new renewable energy capacity
    - Funding e.g., for renewable energy projects, research on renewable energy, energy efficiency improvements
    - Unavoidable emissions are compensated by paying someone else to make an equivalent carbon dioxide saving elsewhere

- Differences in the effectiveness and transparency of green energy products

The interface between voluntary green electricity markets and renewable energy policies is not always simple

- Do green electricity products provide real **additional** environmental benefits?

- Some products include very high share of large hydropower
  - Sometimes hydro is imported from countries like Norway where existing capacity is large
  - Green electricity from existing plants is not likely to create new renewable energy capacity

- Risks of double counting
  - Some suppliers may aim only to meet binding targets with voluntary green energy products
    - Required renewable energy is assigned to green electricity customers
  - Marketing can be misleading if green electricity products are also included in the total electricity mix

(http://www.greenwellfuture.com/hydro_and_wind_energy_balancin/)

There are labels for green electricity products

- They can
  - Set requirements concerning the age of power plants
  - Set criteria for energy production (sustainability criteria for hydro)
  - Define what kind of energy sources can be utilized
    - Can CHP/large hydro be included?
  - Require investments in new renewable capacity
  - Charge for using the label and use the money to environmental projects (river restoration etc.)

- Labels can also increase market transparency by providing customers with reliable information

Case Study: Eastern Finland
Requirements and local effects of renewable energy

- Qualitative research methods:
  - Content analysis, Empirical approach, Abductive reasoning
- Research data:
  - Six interviews with experts of renewable energy from Joensuu, Finland
- Documents of provincial government related to e.g., energy, bioenergy, climate and economy

Prerequisites to local production of renewable energy (1/2)

1. Rising energy prices

- Price of oil went up and money could be saved by using bioenergy
- No strong environmental motive was needed, renewable energy could help local economy

2. Small and medium sized actors

- Many of them related to forestry, culture of doing things themselves and not relying on larger actors
- Bioenergy can be produced as a by-product of forestry, making use of existing strenghts

3. Expertise

- Long traditions in forestry in North Karelia

Prerequisites to local production of renewable energy (2/2)

4. Cooperation

- A lot of cooperation between different towns, coordinated by the provincial government of North Karelia
- Cooperation and leadership are found to be important

5. Regional policy

- Bioenergy is mentioned as one of the important areas of economic development in Joensuu
- Interviews show that people see that bioenergy is the future in the area
- Bioenergy is mentioned in the documents of the provincial government strategy and goals are set for bioenergy

Conclusions

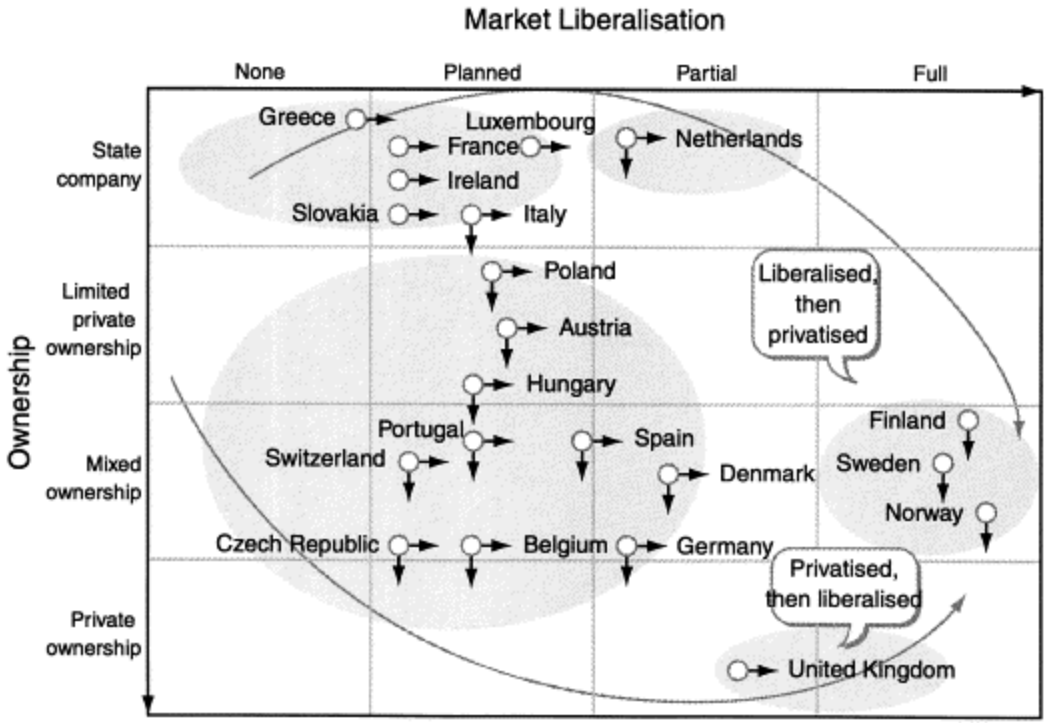
- Interface between voluntary green electricity markets and renewable energy policies can be problematic
  - It is very important to consider whether green electricity products provide real additional benefits

- Labels can have important role both in setting criteria for the green electricity products and in increasing market transparency

- Various types of products available, can be difficult for customers to assess and compare them and their real impacts

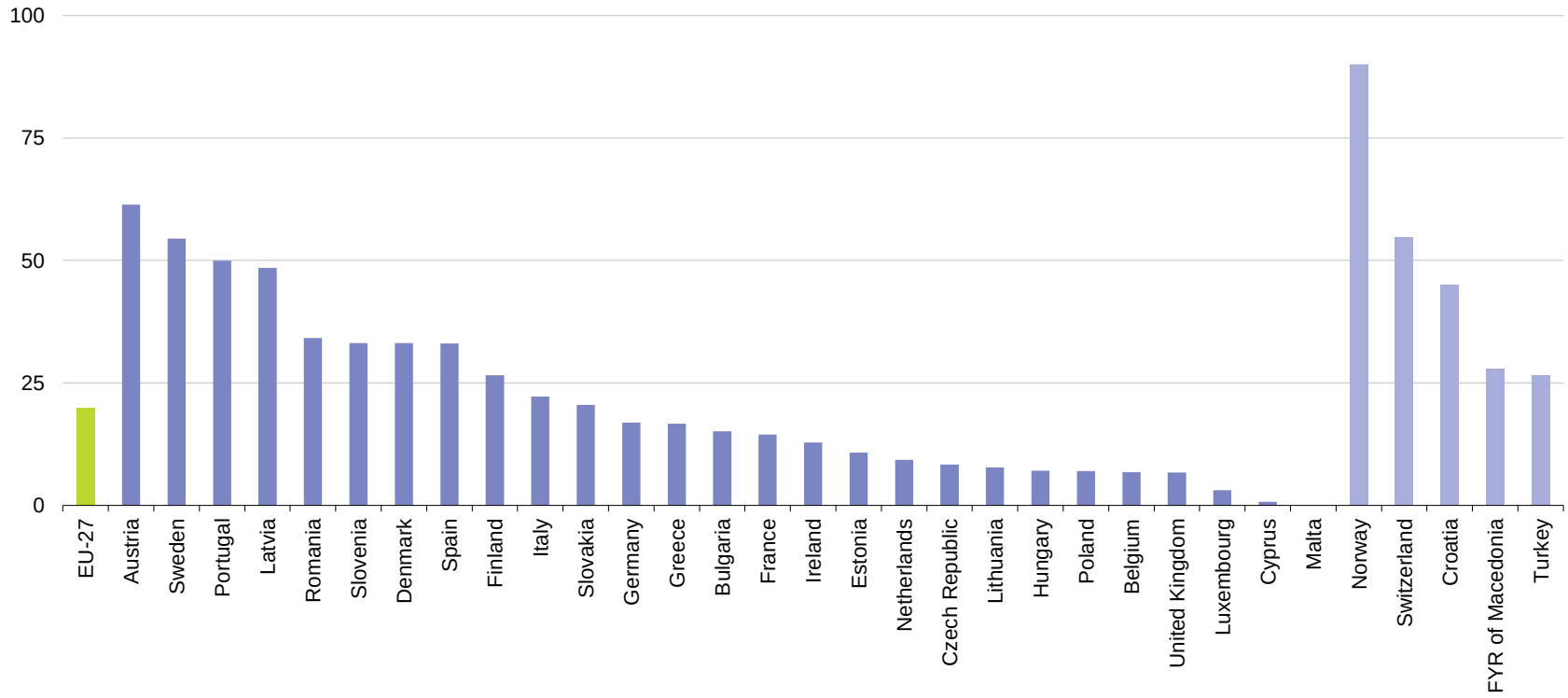
- Case Study: Bioenergy in North Karelia is an important part of local public policy, five prerequisites to increasing local renewable energy production were identified

Market liberalization and privatization in Europe



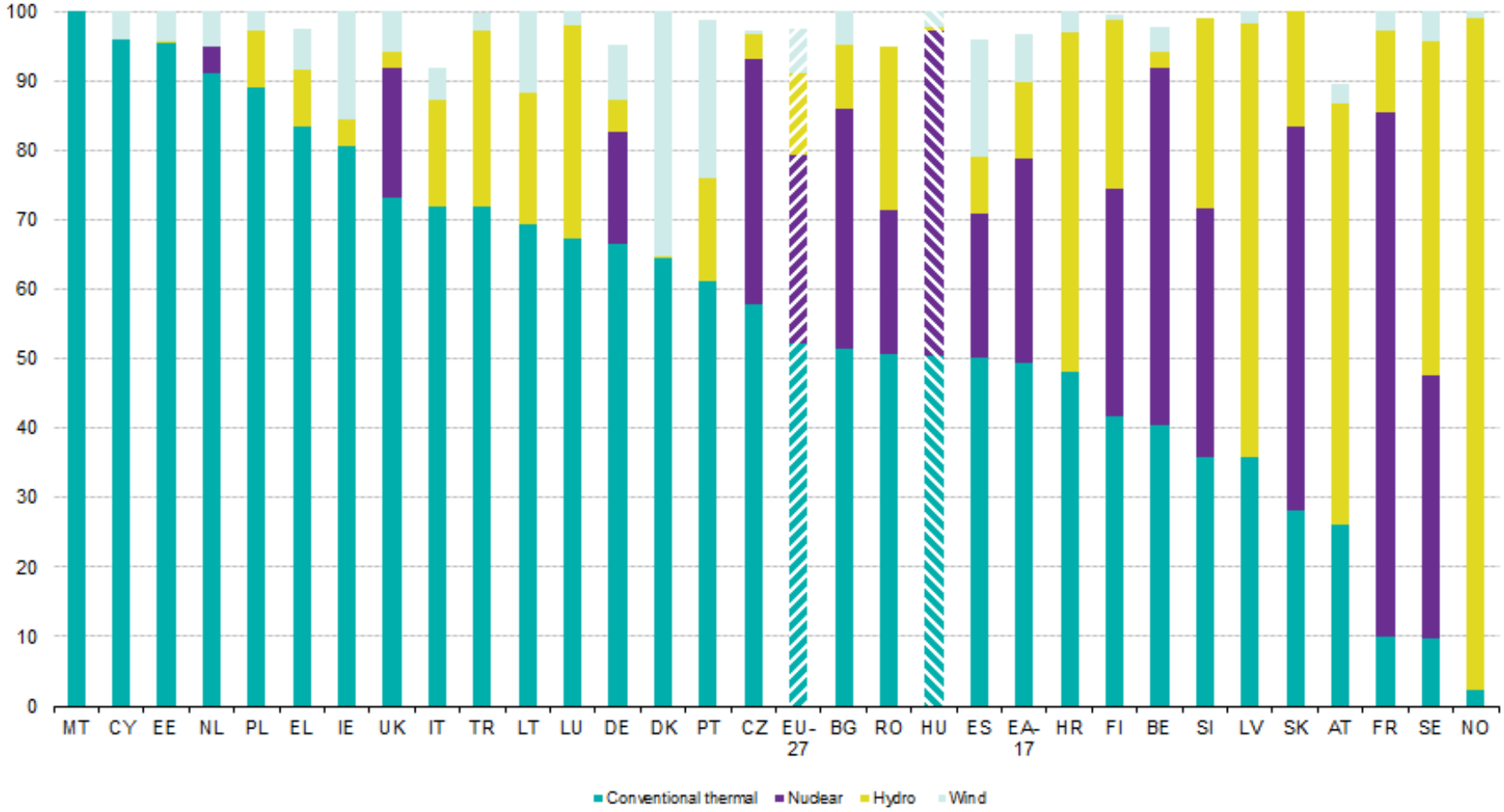
(Rider G., The Electricity Journal, 1999)

Share of electricity generated from renewable sources, 2010 (% of gross electricity consumption)

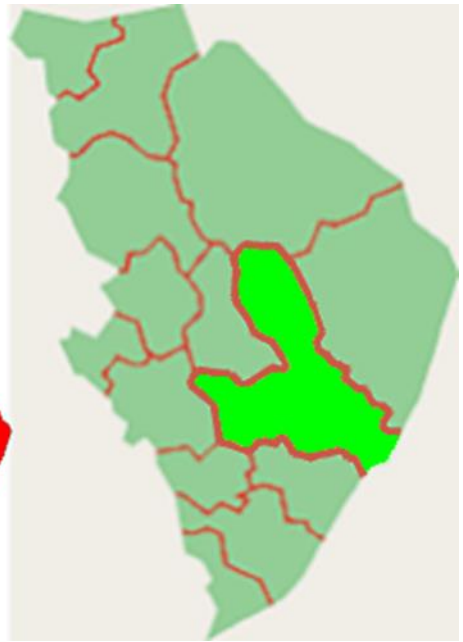


(Eurostat, 2013)

Electricity production by source in 2012 (%)



(Eurostat, 2013)



Province of North Karelia:

The province has had problems since the depression in the 1990's There is a drive towards creating new economic development in the province (information and communication technology, the creative industry and bioenergy)

City of Joensuu:

72 000 inhabitants

Kiihtelysvaara, Tuupovaara, Eno and Pyhäselkä have joined Joensuu

-> population growth

1. Rising Energy Prices

- North Karelia and Joensuu has used a lot of fossil oil for heating until the end of the 1990s
- The price of oil went up at the end of the 1990s
- → Expensive heating
- → Bioenergy
- This made it possible to convince everyone that renewable energy is a good option.
- No strong environmental motive was needed → the motive was to save money
- They also realised that they could help the local economy this way. Money that was spent before on oil stays now in the area of North Karelia.

2. Small and Medium Sized Actors

- There is a lot of small and medium sized actors in North Karelia and many of them are related to forestry

- → They have the culture of doing things themselves and not relying on larger actors.
- Bioenergy can be produced as a by-product of forestry
- → Making use of existing strengths and local production models

3. Expertise

- Long traditions in forestry in North Karelia
- There seems to be a cross-generational connection in the knowledge of forestry.
- Five out of six people interviewed had a background in forestry. They were also from different age groups (59 years, 40 years, 27 years) which indicates that there could be a cross-generational connection

4. Cooperation

- There seems to be a lot cooperation between different towns in North Karelia.
- This cooperation is coordinated by the provincial government of North Karelia.
- The role of the provincial government was said to be important
- → changes need guidance and leadership
- → Cooperation is important

Regional Policy

- Bioenergy was mentioned as being important in regional policy in the documents and interviews
- Bioenergy is mentioned as one of the important areas of **economic development** in Joensuu.
- Bioenergy was also mentioned in documents of the provincial government strategy of North Karelia
- → strategy of the province

- Bioenergy has not solved financial problems in North Karelia but the people interviewed see that bioenergy is the future in North Karelia.
- Provincial government goal in bioenergy:
- Making the province 100% free of fossil oil by 2030 by using wood to produce heat and e.g. bio-oil for cars. Biogas was also mentioned as a possibility