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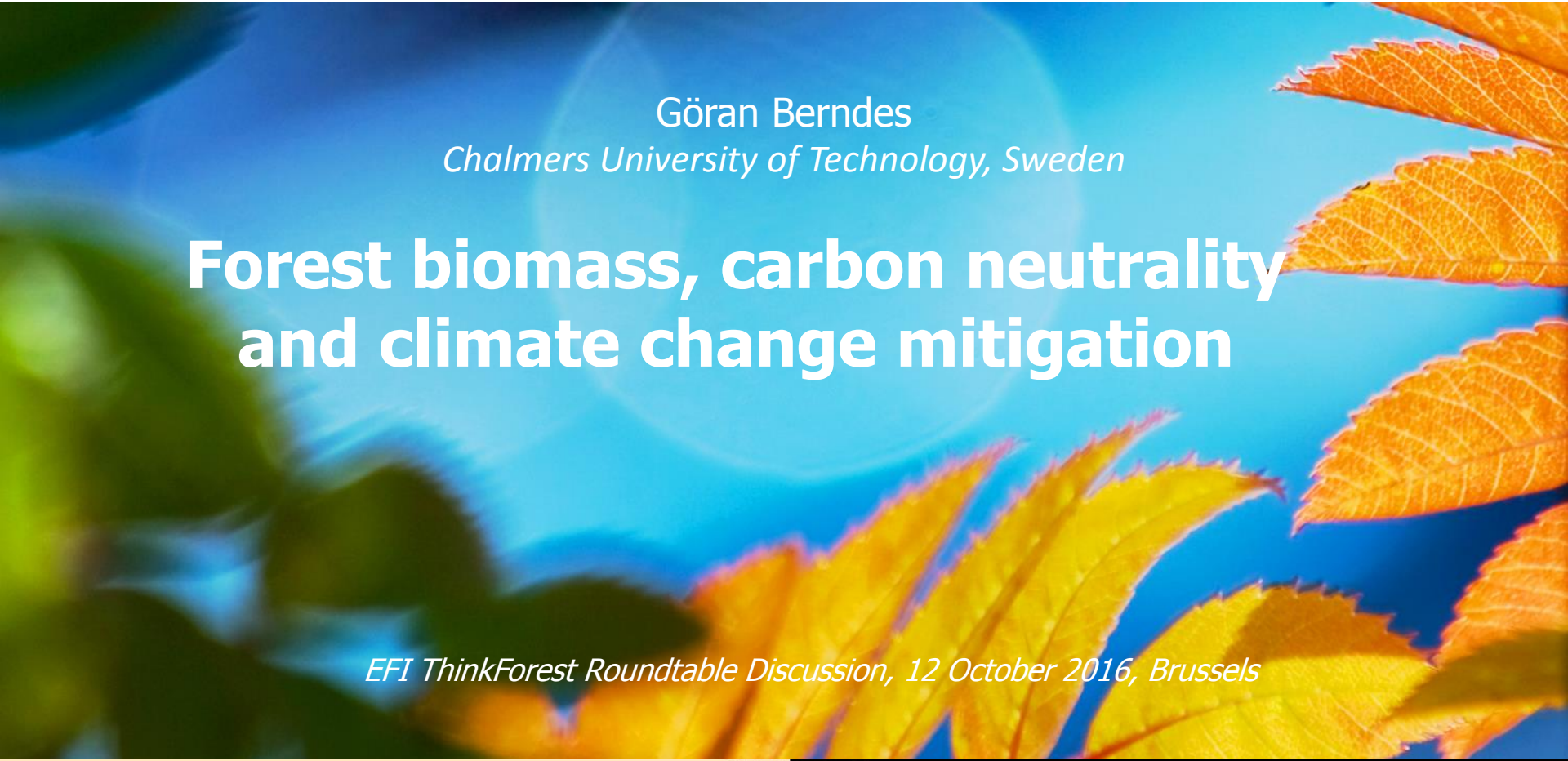

Göran Berndes
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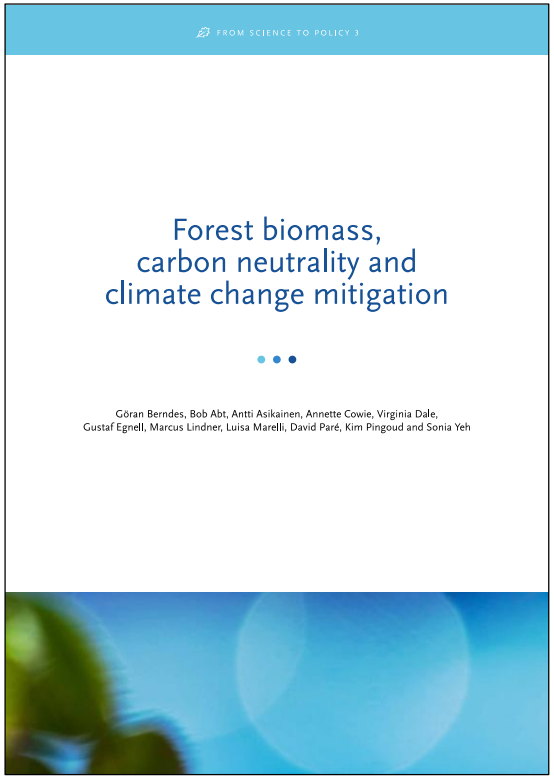
# Forest biomass, carbon neutrality and climate change mitigation

*EFI ThinkForest Roundtable Discussion, 12 October 2016, Brussels*

# Outline

1. Background: discussion on bioenergy carbon neutrality
2. How is forest bioenergy produced?
3. Assessing bioenergy climate impacts
4. A synthesis of science knowledge
5. Policy implications




The publication can be downloaded here:

http://www.efi.int/portal/policy_advice/publications/from_science_to_policy/

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# Discussion on bioenergy carbon neutrality

- Climate impact of bioenergy critical for EU
- Carbon neutrality debated topic
- No clear consensus among scientists
- Different points of view concerning policy objectives
- Different methodological approaches -> different conclusions
- Report: balanced and policy-relevant synthesis on the issue

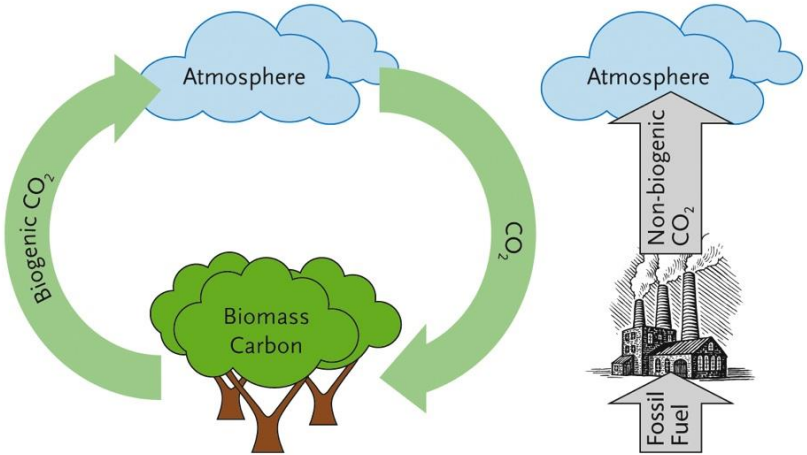



**Illustration of distinction between** bioenergy *(cyclic carbon flow)* **and fossil-based energy** *(linear carbon flow)*

Figure: National Council for Air and Stream Improvement

# How is forest bioenergy produced?

- Integrated systems that deliver bioenergy and other forest products
- Process by-flows, residues and low grade / small diam. stems from forest operations
- Process energy in forest industry, fuels and electricity for other markets
- Low fossil fuel inputs in common supply chains

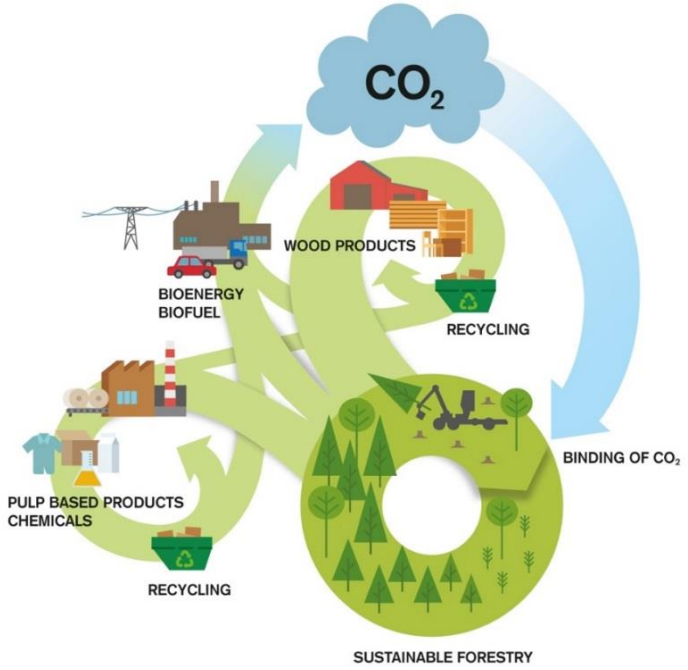



Figure: Sveaskog

# How is forest bioenergy produced?

- Forest area, biome, ownership, forest industry structure, and the objectives and culture related to forests differ significantly between MS
- There is a diversity of forest types and management systems across Europe
- Bioenergy implementation will consequently look differently in different locations

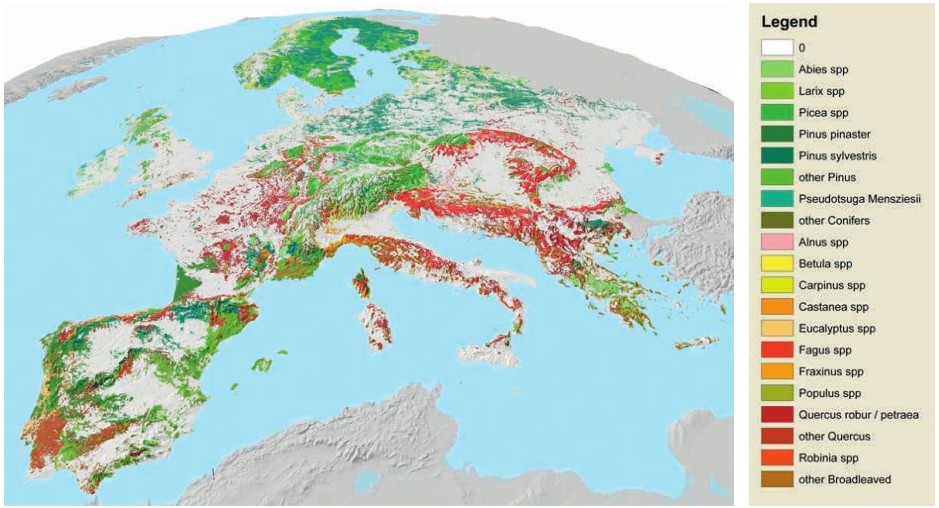



Figure: Nabuurs et al, 2015. A new role for forests and the forest sector in the EU post-2020 climate targets.

# Assessing bioenergy climate impacts

**Methodological choices influence outcome:**

- Definition of counterfactual (ref) ”no bioenergy” scenario
- Time frame: short-term or long-term evaluation period
- Spatial scale: forest stand level or landscape level
- Scope: economic aspects, actors and markets included?
- Metric choice, e.g., GHG balance or warming contribution

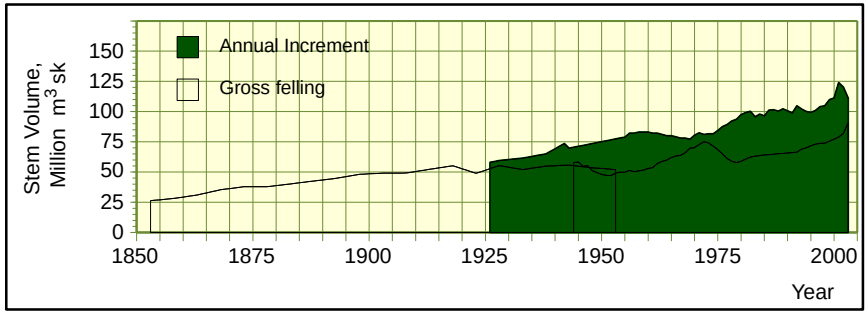



Photo: Dan Neary, USDA-FS
Figure: Eliasson et al, 2011. Forest carbon balances at the landscape scale and responses to intensified harvest investigated with the Q and COUP models.

# Assessing bioenergy climate impacts

- Landscape level appropriate for informing policy
- Stand level too narrow and potentially misleading
- Economic and biophysical dynamics are important
- Integrated ”total system” modelling provides important insights

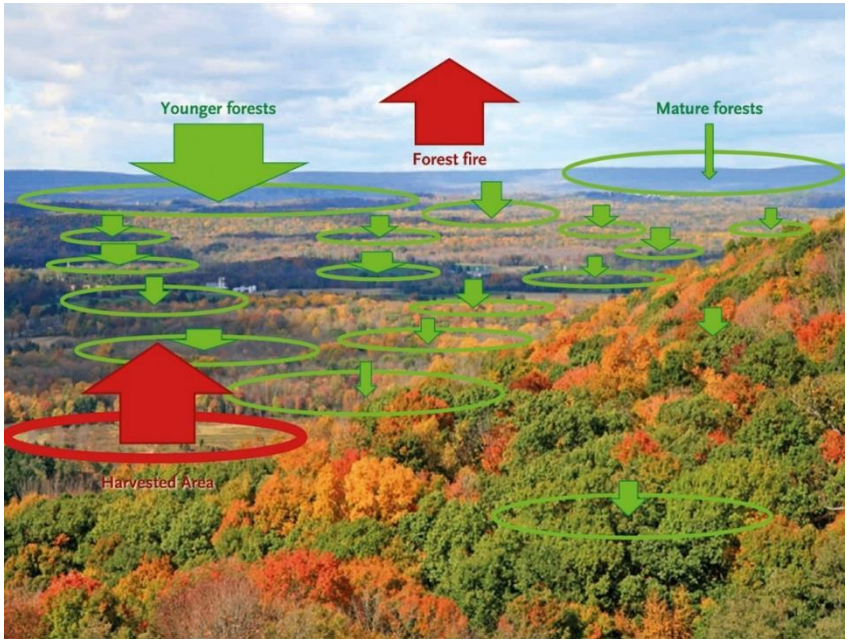
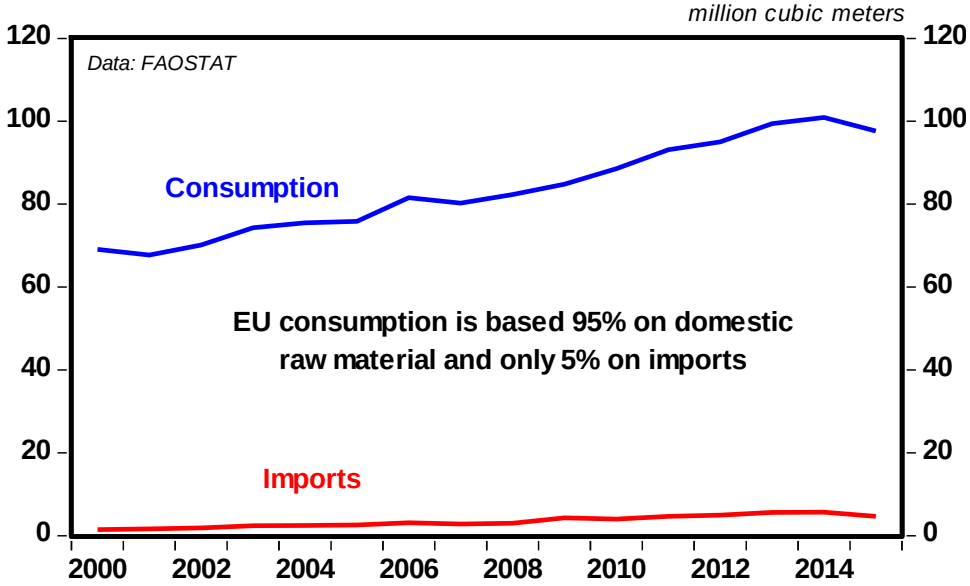



Figure: National Council for Air and Stream Improvement

# Impacts outside EU?

- Forest feedstock imports to EU for bioenergy do not play a big role *(see Figure)*
- Pellets production for the EU corresponds to a few percent of harvested wood products in Canada and SE US
- Pellet demand have some influence but higher value markets most important for land management planning

**EU energy wood* consumption & imports 2000-20015**

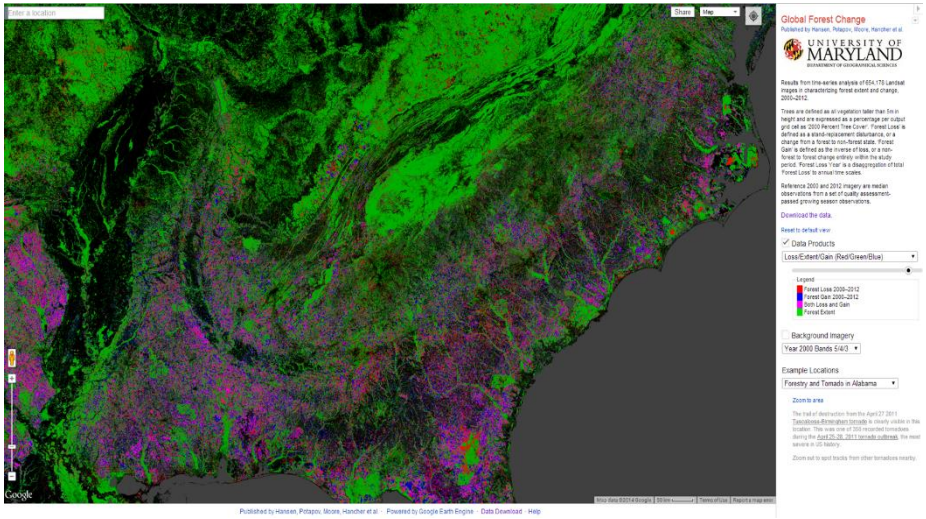



*Energy wood = FAOSTAT wood fuel = e.g. pellets, firewood, chips, sawdust for purposes such as heating or power production

# Impacts outside EU?

- EU pellet demand not expected to have any significant influence on forest carbon stocks in Canada. Climate change a concern. Salvage wood use for energy an opportunity.

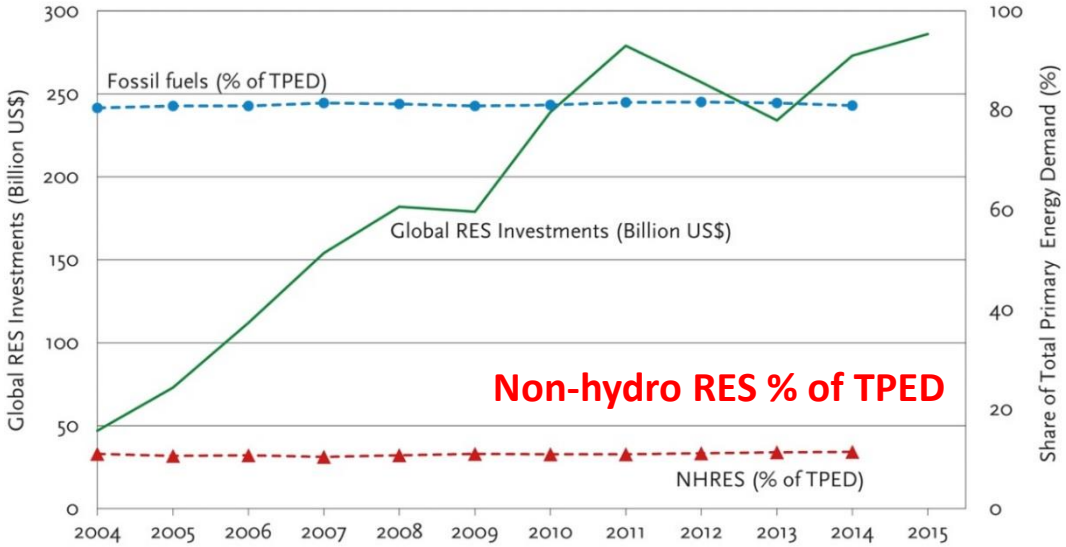
- SE US privately owned market-driven bioeconomy. Forestry intermingled with agriculture. Increased pellet demand might result in some increases in forest carbon stocks. But housing market dominant driver.




**Purple color is both loss and gain in forest 2000-2012**

# A synthesis of science knowledge

- Difficult to meet long-term climate target without bioenergy
- Fossil fuel displacement efficiency critical
- Feedstocks more or less debated (residues vs stems)




**Global investments in renewable energy sources (RES) and total primary energy demand (TPED)**

Figure: Filip Johnsson, Jan Kjaerstad and Johan Rootzén, Chalmers University of Technology, Sweden.

# A synthesis of science knowledge

- Impact of bioenergy on net GHG emission savings is context- and feedstock-specific due to that many important factors vary across regions and time
- There can be trade-offs between carbon sequestration, storage, and biomass production – and between short term and long term climate objectives
- Variation in results calls for stronger efforts to ensure that results are carefully explained and interpreted correctly

**Trees killed by spruce budworm, Quebec**

Photo: Evelyne Thiffault, Laval University, Canada.

# Policy Implications

- European forests and associated industries play important role in GHG balance > **sequester** and **store** carbon and **displace** fossil fuels
- Critical that policies create a situation where promotion of bioenergy and other non-fossil energy options lead to **fossil fuel displacement,** rather than competition among non-fossil options

Photo: FreeBigPictures.com

# Policy Implications

- Consider policies in **context** of regional forest and energy sector.
- ***One-size-fits-all policies*** **are unlikely to be optimal**
- **Generic classification system** *(eligible/non-eligible)* for different forest biomass types may **prevent effective management** of forest resources to economically meet multiple objectives, including climate change mitigation

Photo: FreeBigPictures.com

# Policy Implications

- **Cascading** use makes sense as a general rule, but should be applied with **flexibility**, and considering what is optimal for specific regional circumstances
- Knowledge and experiences of forest bioenergy should be shared and discussed, to facilitate development of **regionally tailored management guidelines**

Photo: FreeBigPictures.com

# Overall conclusion

The use of forest biomass for energy is likely to make economic and environmental sense, if accompanied by a package of measures to promote best practices in forest management for climate change mitigation

Photo: Brent Perry

# Overall conclusion

Involving policymakers and stakeholders in defining policy-relevant research questions increases the likelihood that results are relevant, interpreted correctly, and useful in the policy development process

Photo: Brent Perry

# *Thank you!*

**Byholma airport: storage of about 1.3% of trees felled by storm Gudrun**

Photo: www.goranssonsakeri.se