Systems Analysis and Bioeconomy

Current Highlights and Ideas for the Future
Highlights

Large-scale introduction of forest-based biorefineries: actor perspectives and the impacts of a dynamic biomass market

• Profitable investments in the production of liquefied biomethane (LBG) integrated with sawmills would require a policy support level of 32-38 EUR/MWh, given the current biomass market conditions.
• If impact on biomass markets are explicitly included, the necessary policy support increases by 13-44%.
• Excluding the market impacts would result in substantial underestimation of the policy support level necessary to maintain a large-scale biofuel production.

# Highlights

**Environmental Impact and Environmental Cost Assessment of Methanol Production from Wood Biomass by Novel and Conventional methods**

- The pre-treatment stage have the highest environmental impact during methanol production. Also, the choice of energy source affects the environmental impact of methanol production.
- Overall, the novel methanol production process has a lower climate impact, albeit by relatively little, but a significantly higher HNCTP and LUP impact.
- Estimated environmental costs:
  - Novel process 43.95 €/t
  - Conventional process 23.41 €/t

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Highlights

Meeting challenges in forestry: improving the performance and competitiveness

• The harvested volumes of can significantly increased by improving the efficiency.
  – Fuelwood by 7.8% on average
  – Harvesting residues by 9.7% on average
  – Pulpwood by 8.5% on average
  – Sawlogs by 9.2% on average

• This will have a price reducing effect.
  – Fuelwood by 4.3% on average
  – Harvesting residues by 4.1% on average
  – Pulpwood by 25.7% on average
  – Sawlogs by 20.3% on average

Highlights

Sustainable Return on Investment (SROI) of Light-weighting of Cars for Different Fuels

- For electric vehicles and cars running on forest wood biomass based fuels, light-weighting of body parts with advanced high strength steel is recommended.
- For petrol and corn biofuel driven vehicles, light-weighted body parts made of carbon fiber reinforced polymer composites yields better sustainability benefits.

Highlights

Market integration

• Nordic roundwood markets:
  – 11 Nordic roundwood markets are investigated.
  – The Law-of-one-price does not hold for most markets. Only the Swedish and Norwegian pine sawlog markets are found to be integrated.

• Swedish roundwood markets:
  – Market integration in three Swedish regions (Central, Northern, and Southern) for pine and spruce are investigated.
  – The law-of-one-price hypothesis holds.
  – Short-run bi-directional causality between the Northern and central markets is uncovered and long-run causality is detected between Northern and Southern markets. The central market emerges as the price leader.

• Roundwood prices in Sweden is co-moving.
• Roundwood prices in the Nordic countries are not co-moving.

Highlights

Pilot and Demonstration Plants in Sustainable Technology Development: The Case of Commercializing the Bio-based Economy

- A large Formas-funded project that now nearing its completion.
- Addresses the roles of pilot and demonstration plants in bringing novel sustainable technologies to the market. This has been achieved in the empirical context of the development of biorefinery technology.
- Areas of investigation:
  - An Innovation System Perspective.
  - Different Types of Pilot and Demonstration Plants.
  - Well-functioning networks: actor roles.
  - Knowledge problems (and types).
  - Managerial and Organizational Challenges and Solutions.
  - The need for an innovation policy mix.
  - Lessons from Swedish Biorefinery Development.

Please contact me for a complete publication list from the project.
Ideas for the Future

• Continued focus on the development of biorefineries and increased focus on method and model development.
  – Negative emission options.
  – New technologies, value-chains, feed-stocks and bioproducts.
  – Institutional settings and behavioral aspects.
  – Integrated assessment approach.
  – Dynamic aspects, discounting and endogenous technical change.
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