

Report on Session „Flexible (bio)power generation - The future for biomass in the energy system?“

Session chair: Marcus Eichhorn
Minute taker: Jakob Hildebrandt

Main Topics:

Potential of **flexible power generation** from biomass for **power system optimization**

Economic analysis of the experiences with the **market premium scheme**, which aims to incentivise **flexible power feed in** of renewables and to **improve marketing efficiency**

POWER

Biomass

HEAT

FUELS

Techno-economic modelling of the development of bioenergy generation technologies under **resource competition** and **GHG-criteria**

Main results: Flexible (bio) power generation optimization

- **Demand for flexibility increase** as wind and solar will develop more dynamically than bioenergy.
- Modified existing plants offer **potential to partly offset fluctuations** from wind and solar
- Biogas **ideally complement daily solar production profiles**; wind profiles require more storage volume/grid connection.
- But Bioenergy will not be able to fully offset residual load fluctuations from wind and solar.

Main results: Modelling of Bioenergy Competition

- Vegetable oil and biogas based options are and remain cheaper than wood based options as both fuels/power (assuming flexible demand)
- Sensitivity analysis shows that „2nd generation“ biofuels are unlikely to become competitive in Germany and if so, CH₄ is the better option
- Feedstock prices dominate the sensitivity. Learning and GHG have marginal effects on the competition *between* bioenergy options.
- If we want bioenergy from dedicated crops → CH₄
 - Suitable with flexible demand
 - Gas-powered mobility should be stimulated

Increasing efficiency in food sector is a prerequisite

Main results: Assessment of Market Premium

Marketing efficiency of Market Premium:

- Increases marketing efficiency for dispatchable RES
- Reductions in transaction costs mainly through economies of scale

Incentives for demand-oriented production:

- Intermittent RES: Curtailment remains the primary reaction, but this decreases flexibility incentives for conventional plants
- Dispatchable RES: incentives for curtailment and provision of negative balancing power, few incentives for positive load shifts
- Adjustment of market framework to requirements of intermittent RES is needed

Research need: Flexible (bio) power generation technologies

- How big is the demand for boosting the installed power generation capacity from biogas?
- How big is the demand for gas storage volume/grid extension?
- solid biomass plants should be enabled to modulate power production more dynamically.
- Additional efforts are necessary to maintain high energy efficiency using flexible biomass in CHP operation (heat demand profiles → heat storage).

Research need: Modelling Bioenergy Competition

- Models for agricultural price developments when land becomes scarcer
- Better and more transparent data basis (less room for uncertainty and lobby)

Research need: Assessment of Market Premium

- How can market framework conditions be adjusted to better reflect the requirements of intermittent RES?
- How to implement flexibility incentives for other market actors than RES, e.g. conventional plants and the demand side?

Take home message:

- Ø Bioenergy offers promising potential to minimize residual load from wind and photovoltaics
- Ø A high biofuel reliance implies more gaseous fuels in the transport sector
- Ø Market integration of renewables alone is not the solution for balanced energy system