



**Analysis on market outlook and future viability
of different bioenergy products and value chains
in the Baltic Sea Region energy system**

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Take home message



- Increased use of biomass in district heating and CHP plants is an efficient way to reduce GHG emissions and increase the renewable energy shares.
- There are also good opportunities to install modern wood and pellets stoves and heating centrals that will reduce emission and local air pollution.
- At low carbon prices (short run) biomass will replace coal, natural gas and wind power in the heat and power sectors.
- In a longer perspective (higher carbon prices) solar, wind, natural gas and power to heat becomes more competitive. More biomass will be used for biofuels and green chemicals. Wood chips and biogas will play an important role for security of supply and peak load in the heat and power sector.

**Report on Market Outlook and Future Viability of
Different Bioenergy Products and Value Chains in the
Baltic Sea Region Energy System**

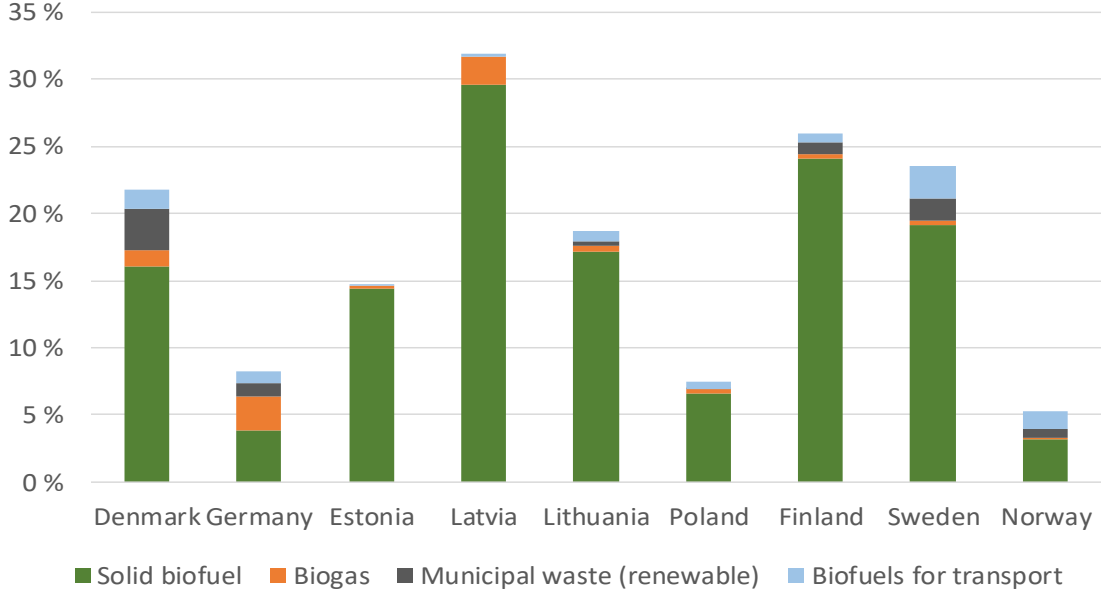
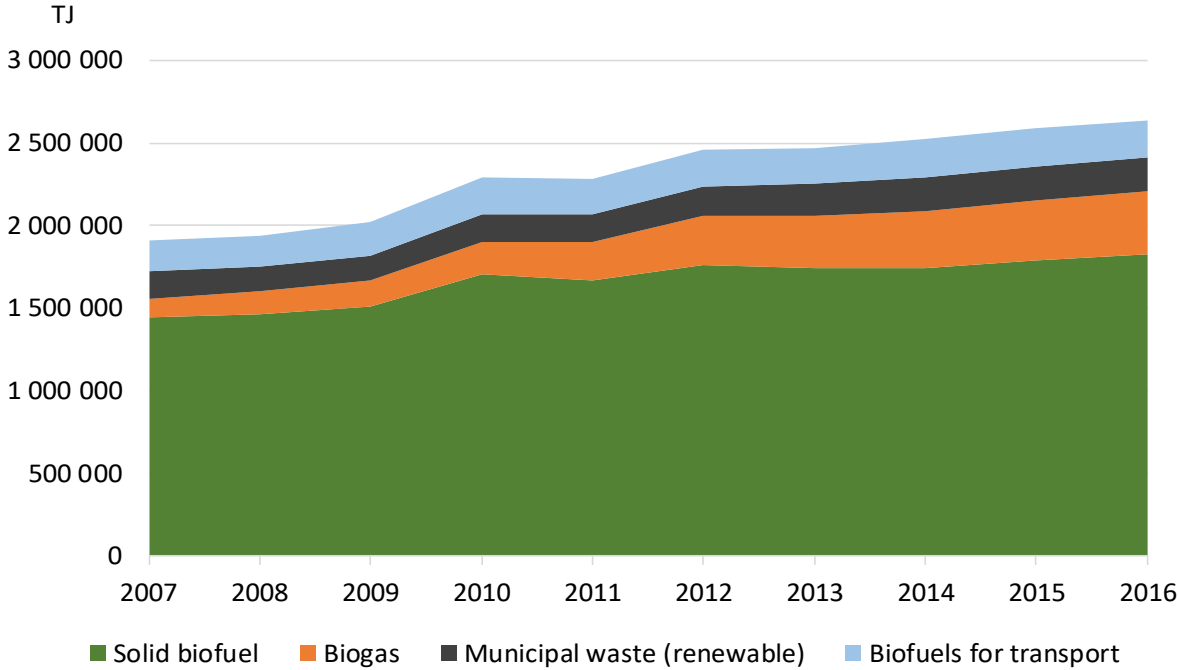
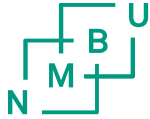
Erik Trømborg and Eirik O Jåstad

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Version 2.0

1. Historic developments in energy consumption, prices and fuels in the Baltic region
2. Outlooks: Scenarios and modelling results
3. Main findings and conclusions

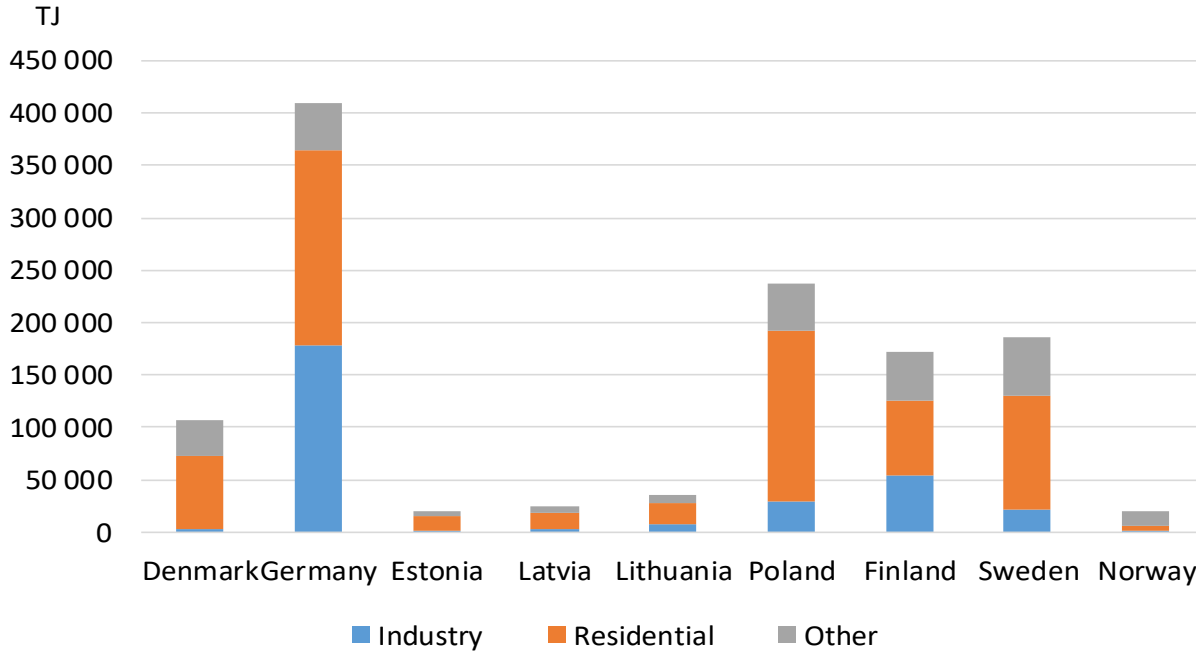
Historic developments – use of biomass in the Baltic region



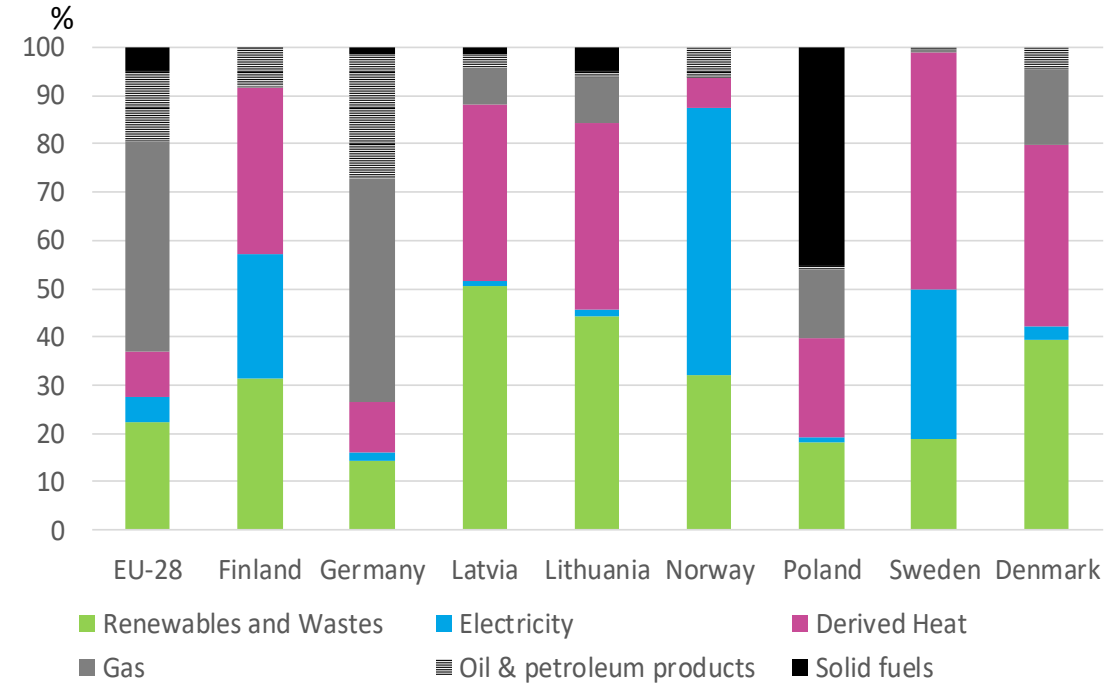
Use of biomass in the Baltic region 2007-2016. (Estonia, Latvia, Lithuania, Sweden, Denmark, Finland, Norway, Poland and Germany). Source: Eurostat [nrg_110a].

Use of biomass as shares of gross inland energy consumption in the Baltic region countries 2016

Heating systems

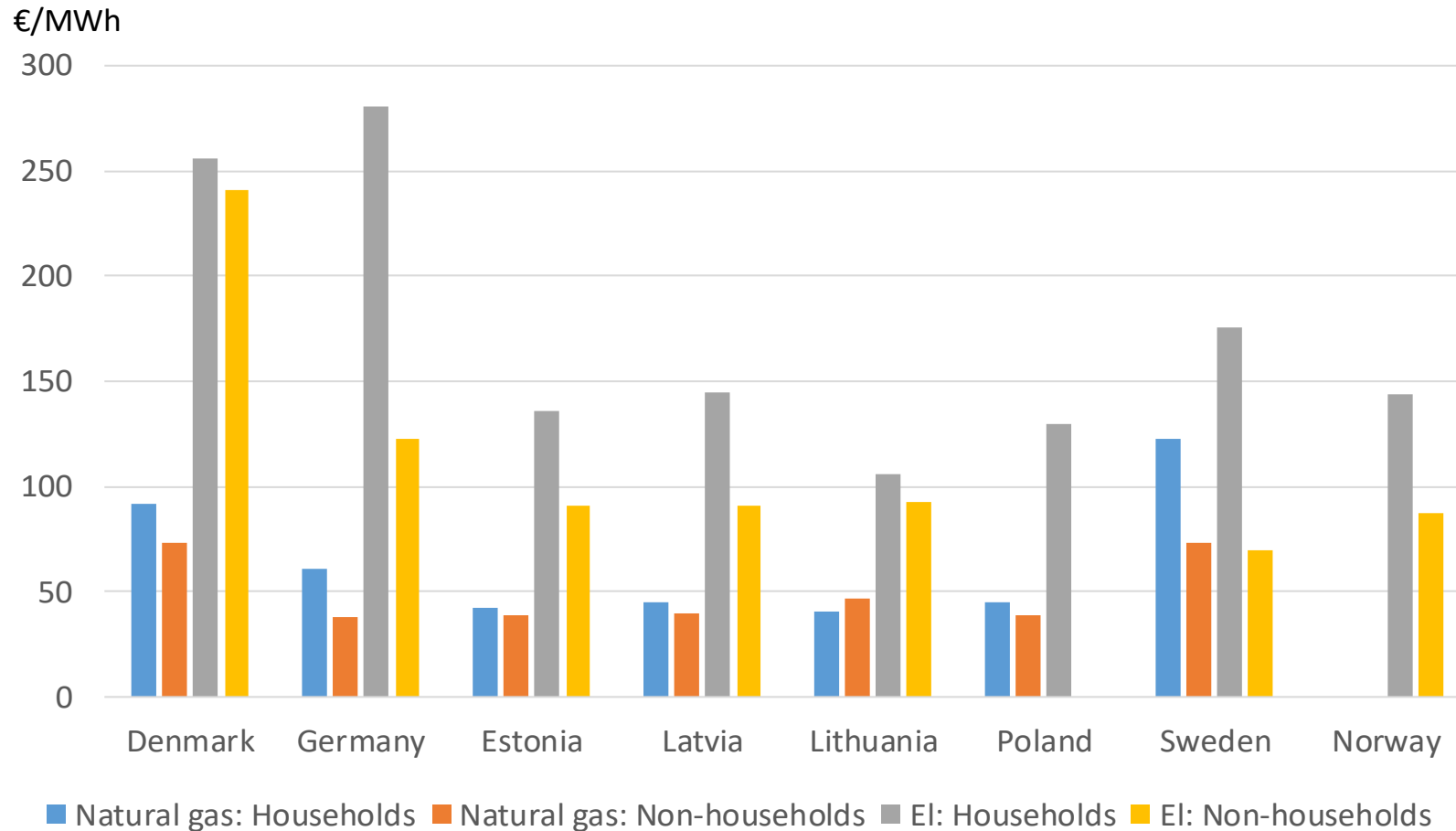


Consumption of **derived heat** (e.g. district heating) by sector and country in the Baltic region 2016. Source: Eurostat [nrg_110a].



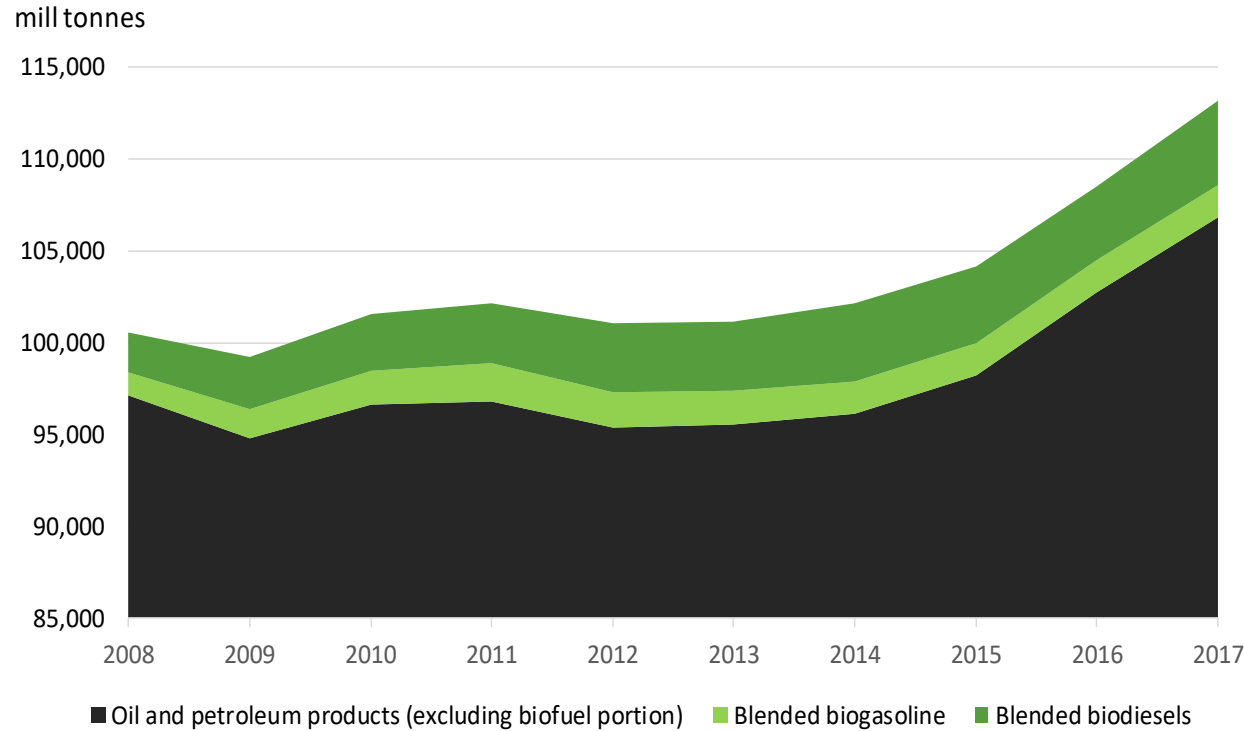
Fuels for **space heating in households** 2016). Data for Estonia not available, but data from Statistics Estonia indicates that close to 50% of space heating in households in Estonia are provided by renewables and waste (mainly wood based biomass) and about 35% from derived heat. Source: Eurostat [nrg_106a].

Low costs for natural gas is a challenge for biomass heating

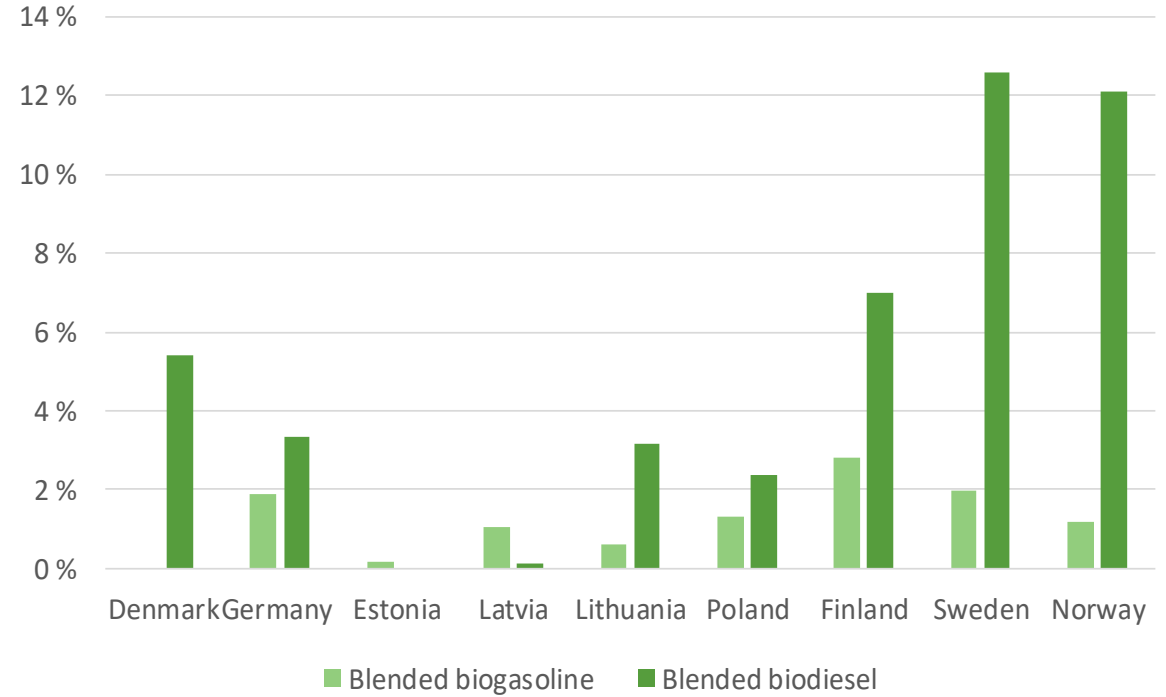


Natural gas and electricity prices inclusive taxes and levies Source: Eurostat table [nrg_pc_202], [nrg_pc_203], [nrg_pc_204] and [nrg_pc_205].

Increasing biofuel consumption



Use of blended biogasoline and blended biodiesel compared to oil and petroleum products for transport. Source: Eurostat (table nrg_cb_oil).

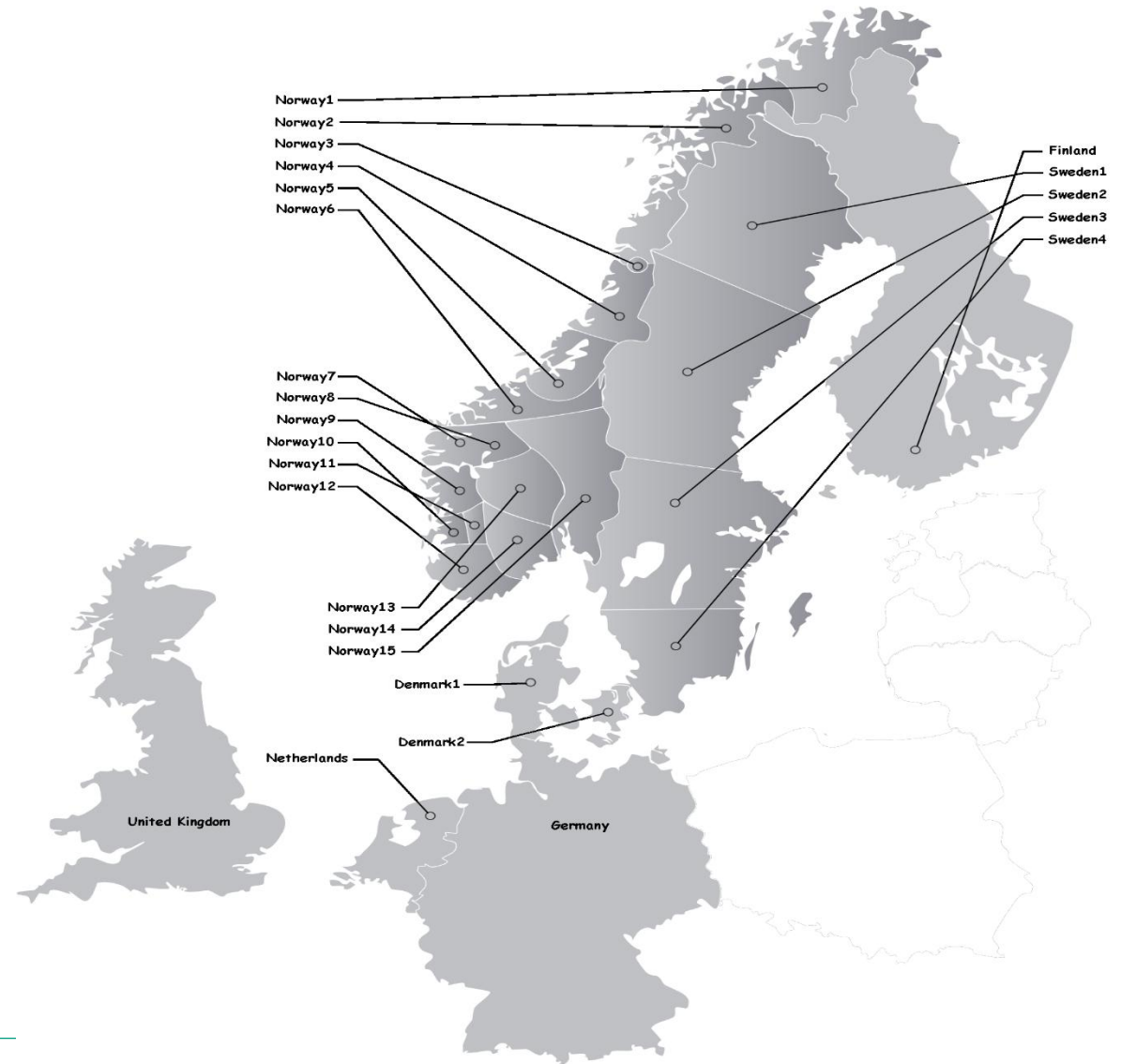


Share of blended biogasoline and blended biodiesel compared to oil and petroleum products for transport per country 2017. Source: Eurostat(table nrg_cb_oil).

Methodology – Balmorel energy system model



- Partial equilibrium model for the Northern European power market
- Detailed data on consumption, generation capacities and transmission lines on a regionalized level
- Investments determined endogenously in a long term model – or alternatively set exogenously
- The market is thereafter simulated at an hourly time resolution
- Thorough modeling of hourly market conditions



Regionalization of the Balmorel model

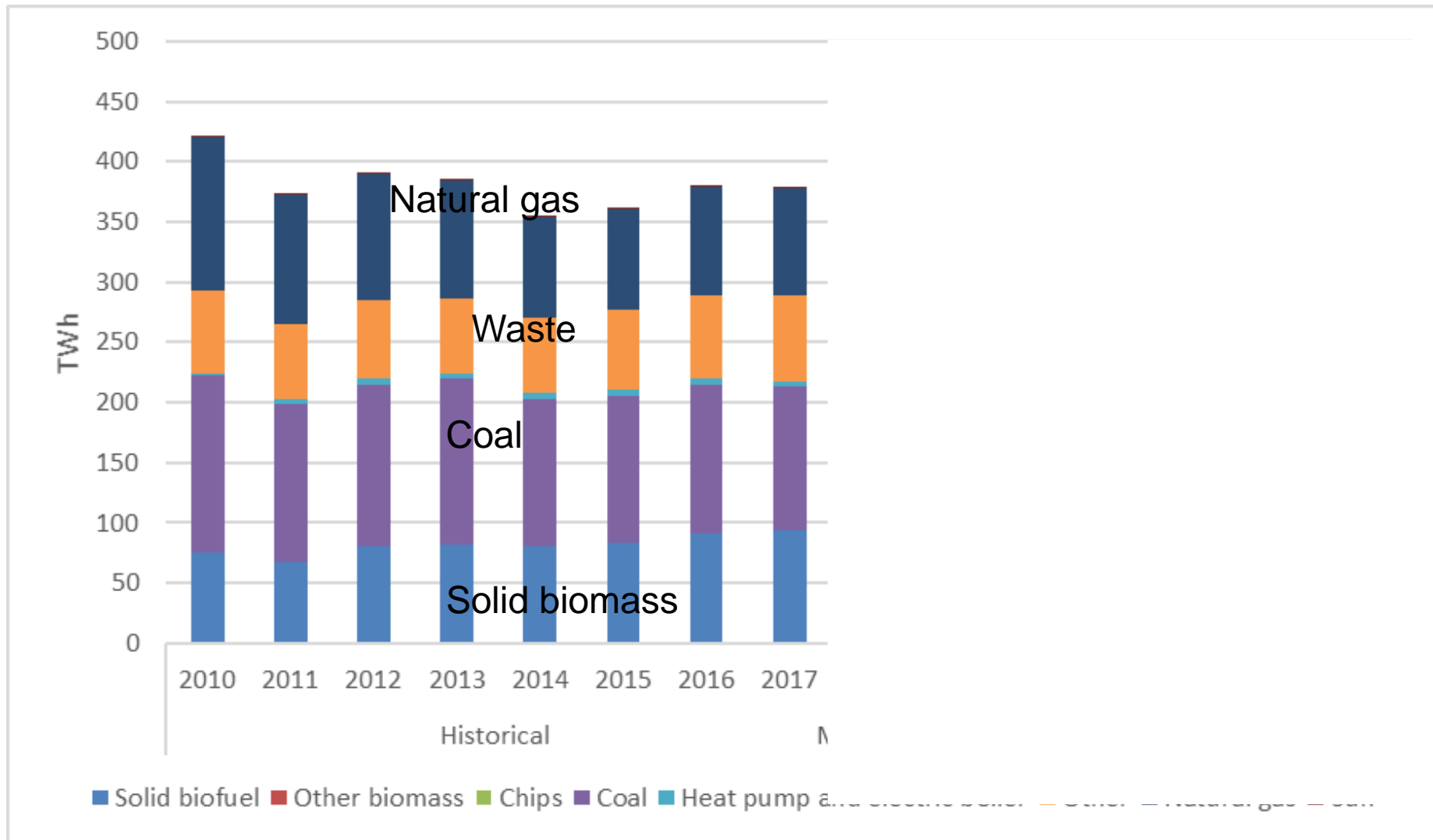
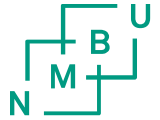
Carbon prices [€/ton] used in the scenarios for 2020–2040



	2020	2030	2040
Low	23	14	32
Base (medium)	23	37	63
High	23	59	94

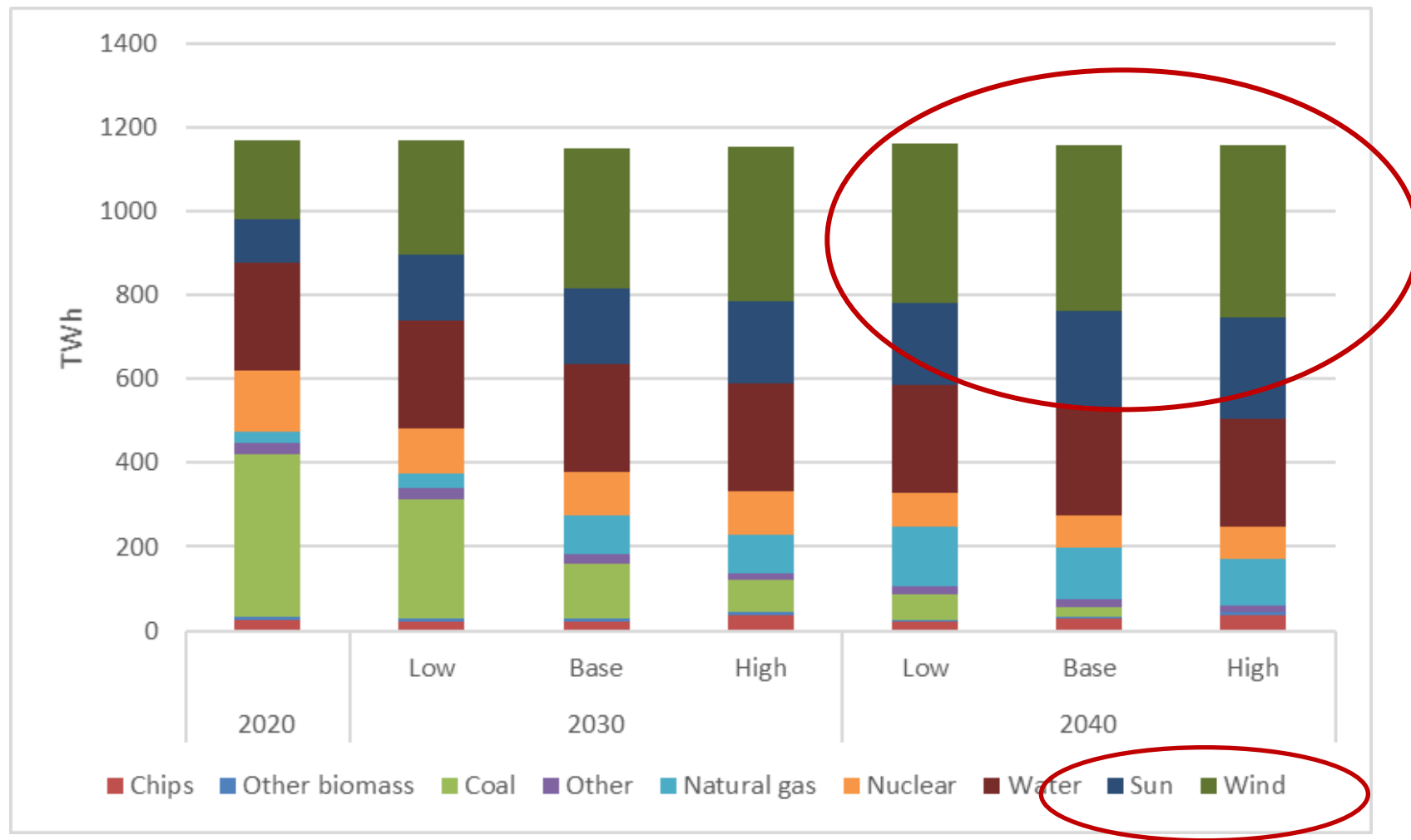
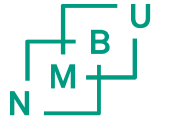
The carbon price scenarios are based on a literature study covering 22 different energy studies and reports. The Base scenario uses the average carbon price, while Low and High represent one standard deviation lower or higher, respectively, than the mean. (March 3: Current 25.50)

Results



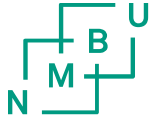
Historic and modelled **district heat production** from different raw materials, for different carbon price scenarios, in the Baltic region for 2020–2040. Eurostat (2019c). Solid biofuel for the historical data includes both other biomass and chips, all types of waste is included as other.

Results



Modelled **power production** from different raw materials, for different carbon price scenarios, in the Baltic region for 2020–2040.

Main findings



- The use of biomass has increased by close to 40% in the Baltic region the last decade. Solid biofuels constitute 2/3 of the biomass use.
- Biogas has increased more than 200% and is currently about 15% of the bioenergy consumption in the region. Germany and Denmark are leading biogas countries.
- The utilization of biomass and chips is increasing with increasing carbon prices. Most of the biomass is used if the carbon price is high in 2030, while the lowest amount of biomass is used if the carbon price is low in 2040.
- Targeted incentives are required for increased use of biomass in the energy sector in the Baltic region. Biomass in district heating which represent a low hanging fruit for reduced GHG emissions in many countries. Carbon costs, regulations, incentives and knowledge are needed for this change.
- Biofuels for transport will continue to be based on agricultural products the next decade, but establishment of second generation biofuel plants is likely to gradually influence the biofuel market.
- In the long run – more biomass will be used for transport and green chemicals and less for heating



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