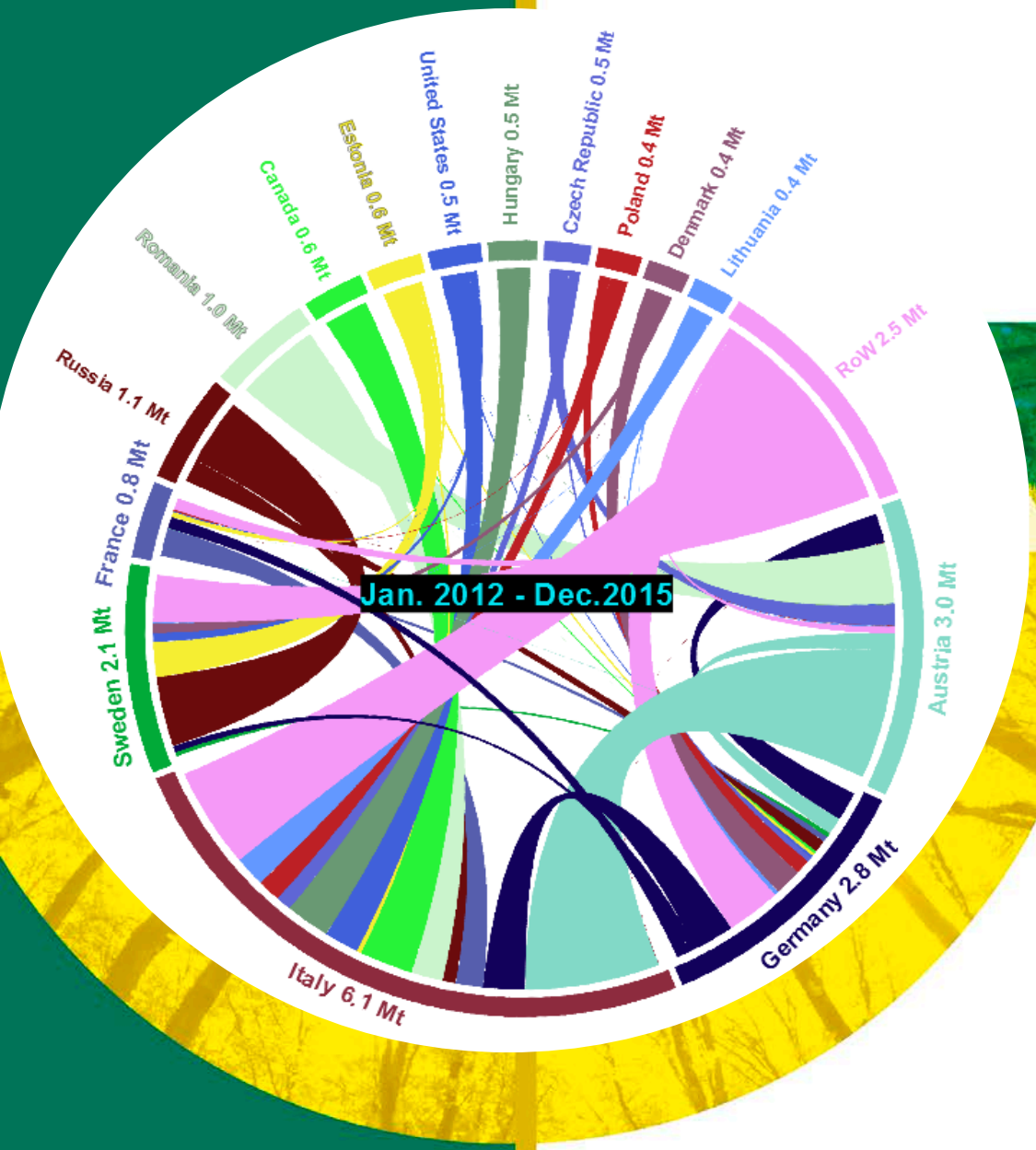
Summary Series

The European wood pellet market for small-scale heating

Data availability, price developments and drivers for trade



Wood pellet trade streams between and towards main small-scale heating markets (*focus-countries*) based on Eurostat from 2012-2015. For all non-focus countries, only exports to focus countries are shown. Trade within the countries and exports from focus countries to non-focus countries are not illustrated. Rest of the World (RoW) includes all imports with smaller aggregated trade flows than 400 kt.

IEA Bioenergy

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The European market for wood pellets used in small-scale heating systems (e.g. residential buildings, hotels, etc.) has been expanding significantly over the past decade. The market for industrial pellets – i.e. pellets used in large-scale facilities such as power stations or combined heat and power (CHP) plants – has been analysed extensively in several previous studies (e.g. Xian et al., 2015 and Olsson and Hillring, 2014). However, for the pellets market used mainly in small scale heating systems, only a very few studies are available (e.g. Kristöfel et al., 2016). Small scale heating based on wood pellets is arguably a mature technology, but whether the *market* for residential wood pellets is mature is another question.

In this working paper we describe and analyse (1) the current market status with regards to internationally traded volumes of wood pellets and potentially underlying drivers as well as (2) the general state of the market for wood pellets for small-scale heating regarding international market integration and other market characteristics. We aim to discern key market drivers, especially when it comes to interactions between national markets. We choose to focus our analysis on five national markets: Italy, Germany, Sweden, France and Austria due to their steady increase in pellets consumption during the last 10-20 years up to 8 Mio. metric tonnes in 2014 and relatively high shares in small-scale conversion to heat. (AEBIOM, 2015)

Several data categories are applied in the analysis including intra-European trade flows and imports from third countries, price developments over time, exchange rates fluctuations and temperature data between Jan.2012 and Dec.2015. We expand a previous discussion of the wood pellet commoditisation process by Olsson et al. (2016) using commodity trade theory, mainly derived from agricultural economics (Barrett and Li, 2002), accompanied with standard econometric tools like regression and time series analysis of and between these data sets. In addition, we consulted with market parties to get anecdotal evidence and expert opinions to help interpret the results.

One of the first observations is that despite vast improvements in wood pellet trade data collection and availability (e.g. by statistical institutions), there are still data gaps and heterogeneous data qualities. However, even though the Eurostat trade flow data has some limitations, it clearly shows a trend of increasing cross-border pellet trade in Europe since 2009. This seems to have translated into a detectable interaction between national markets. Measured in terms of statistically significant interconnections between national prices – we could show this in the case of Germany and Austria. We expected furthermore to reveal interconnections between arbitrage opportunities e.g. price differentials and trade flows. However, a perfect integration with trade can only be assumed for flows from Austria to Germany for some periods between 2012 and 2015. Other established trade routes like Germany to Austria and trade of the two countries to Italy indicate negative and positive marginal profits to arbitrage respectively in varying magnitudes without interconnections to trade flow fluctuations. Interconnections can only be highlighted when including temperature as a proxy for heating demand. Pellet prices are lowest in spring and early summer. This is when Austrian consumers fill up their storages and imports increase. At the same time imports to Italy increase, too. Historically, Italian imports peaked in autumn and winter because Italian consumers buy in bags with fewer storage options. Italian traders adjusted to the lower storage capability of Italian consumers by building intermediary storages and start stocking pellets in May leading to an adjustment of Austrian, German and French exporters. We observe

higher imports from Germany, Austria and also France in months with higher temperatures . Imports to Sweden on the contrary are higher in months with lower temperatures. For the Swedish case, we explain this by limitations in storing pellets for the high share of large-scale pellet consumers. For imports from non-focus countries exchange rates have a measurable effect. The strengthening of the US-Dollar resulted in decreasing imports while the devaluation of the Russian Rubel increased the trade to Germany and Italy.

Unfortunately, the current state of market-related properties of the commodity does not allow the composition of a modelling framework based on competitive spatial equilibrium and theoretical rules of functioning markets for the main wood pellet consuming countries for small-scale heating in the EU. Price volatilities for consumers are well below the volatility of other energy carriers and wood pellet prices are low due to relatively mild winters in 2013-2016 and an oversupply. Still, the development towards a competitive spatial equilibrium should be supported to increase access and affordability of wood pellets in the long run. Therefore, the development of benchmarks should be further supported and a harmonised approach for the collection of residential wood pellet prices in consumer regions introduced. Also, stronger efforts in the provision of other wood pellet related data like traded quality types as well as monthly consumption and production quantities and inventories would be necessary to reduce risks and to increase transparency and thereby increase the liquidity of this market.

With respect to the wood pellet commoditisation process, liquidity and competitiveness of the international markets are the remaining major shortcomings. Discussions with stakeholders revealed less tangible market properties that also have to be considered. Based on market actors, reasons why no correlations between prices and trade flows in the considered time period can be highlighted could include the following; internationally traded and regionally produced wood pellets are sometimes not perfectly fungible, no matter if certified or not, amongst other things due to consumers assigning an intrinsic higher value to regionally produced wood pellets; another intrinsic valuation is given to established contacts and contracts between consumers, producers and traders. Furthermore, the value of wood pellets as a feedstock intermediate could be improved by reducing physical and financial risks of solid biofuel storage.

Based on the presented results and discussion, future research should focus on how to improve the development of the above mentioned market-related properties of the commoditisation process, competitiveness and liquidity. Modelling trials could be advanced by estimating the share of lower and higher quality wood pellets in the trade flow data by comparing specific costs based on monetary and physical trade flows to current residential pellet prices. Balancing monthly supply and demand as well as including information on inventories is expected to enhance the knowledge of trade flow patterns and price formation. Highlighting different impacts of increased international trade with pellets for small-scale heating through modelling overall cost reductions and effect on the resilience towards (supply chain) exogenous parameter changes (e.g. oil price, heating degree days, windfalls, etc.) could be promising future research objectives. Furthermore the convergency process of pellet markets for small- and large-scale use should be observed and analysed. Future research should also discuss consumer perceptions and address the intrinsic value of locally produced wood pellets as well as of established contacts and contracts in bioenergy trade.

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