Trade in Energy Technology Goods – Germany and its Target Markets

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Overview

Energy transition has economic impacts not only through generation costs and investment but also through the multitude of goods and services necessary for this transition. Trade with Energy Technology Goods (ETG) offers technologically leading countries export opportunities and might thus provide stimuli for the respective economies. On the other hand, detecting significant import flows in specific regions might yield an indicator regarding their actions on the path towards energy transition.

ETG production is not limited to single industries but rather spread over different branches. Solely relying on official statistics is insufficient in this case of cross section technology and requires further demarcation of the set of analysed goods building on preceding studies. Moreover, the fact that goods that are considered ETG can be used in other applications complicates a clear-cut differentiation (this is also referred to as the multiple-use problemat), leading us to considering our identified set as potential energy technology goods.

Methods

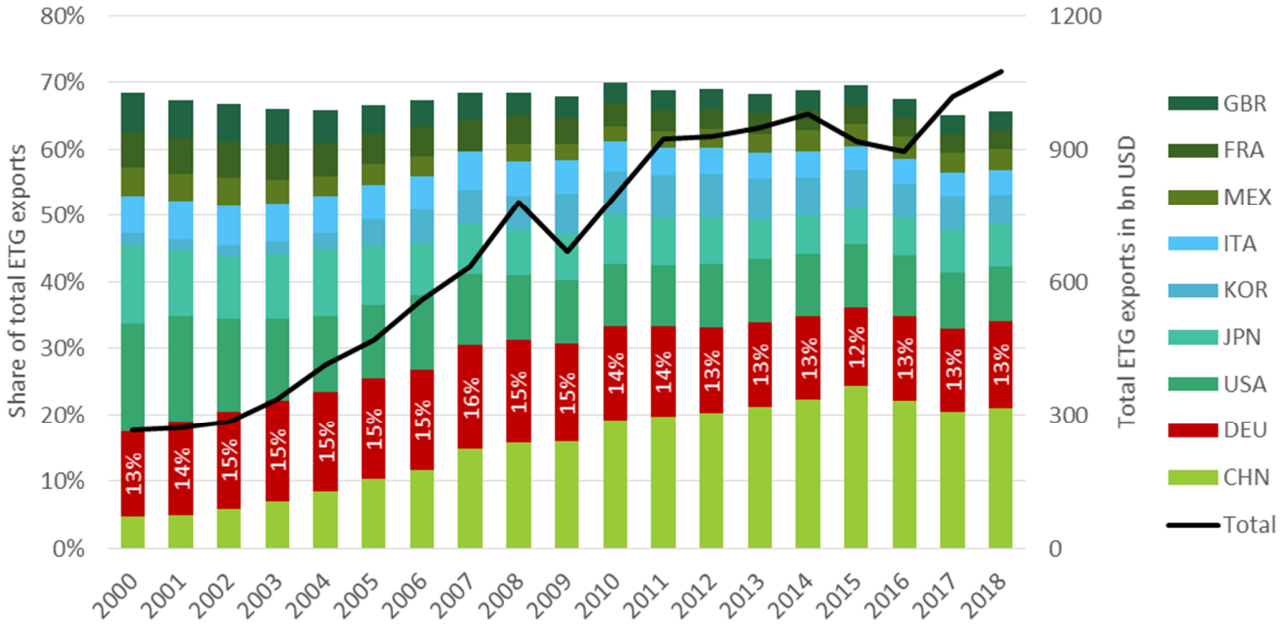
Using the well-established Combined List of Environmental Goods created by OECD (Sauvage 2014) as well as parts of a list comprising potential environmental protection goods (Gehrke/Schasse 2013), we are able to extract a set of potential ETG containing over 200 individual goods at the six-digit Harmonized System classification level. Foundation of our analysis is the United Nations Commodity Trade Statistics database (UN COMTRADE 2020) which covers trade in products across more than 200 regional entities. Our analysis focuses on the time period from 2000 to 2018, the most recent year for which data is available. Descriptive analyses of inter-country trade relationships on different aggregation levels of ETG is extended to indicators describing the competitiveness of a country as well as specialization in importing or exporting certain goods, among others the Revealed Comparative Advantage Index (RCA) and Hirschman Herfindahl Index (HHI).

Results

Trade in ETG measured in current USD has been increasing with an average growth rate of 9% per year since 2000 while total trade in goods has increased by 6% per year. High growth rates in the period up until 2011 – only interrupted by the crisis in 2009 – are followed by a period of stagnation before recently increasing. Total trade volume in ETG reached 1.07 trillion US-Dollar in 2018. German ETG exports develop similarly to the global average, with growth rates up until 2009 slightly higher and from then onwards lower than those of the global ETG trade volume, resulting in an average growth rate of 8% per year. In 2018, the German share of worldwide ETG exports is 13%. Germany is able to keep this share nearly constant over the observed time period despite Chinese exports drastically increasing. China becomes the top exporter of ETG in 2008 and stays in this position until the most recent year while the share of most other top importers decreases (see Figure 1).

We find that Germany's ETG export portfolio is highly diversified compared to those of its potential competitors, regarding products as well as considering the number of partner countries and the distribution of exports among them. The geographical concentration of German ETG exports measured by the HHI not only is significantly lower than that of nearly all others countries, it also shows very little variation over time while the concentration of e.g. Japanese and American exports increases in the years after 2009. The HHI measuring the concentration of products in the export portfolio is also lower in the case of Germany than for basically all other countries. However, there are two product groups among ETG that can be considered of major importance, namely renewable energy systems as well as monitoring, analysis and assessment equipment. Regarding specialisation towards ETG, we find that Germany has comparative advantages in the sense that domestic producers can establish themselves more easily in foreign markets than it is possible for foreign producers in the German market – although this advantage is not as big as in the case of many of Germany's potential competitors.

Figure 1: Share of total ETG exports of 2018's top exporters and total trade in ETG in bn USD (right axis) over time



Source: UN COMTRADE (2020), own depiction.

Conclusions

Building on existing definitions, we are able to identify a set of potential energy technology goods that can be distinguished into several thematic groups. Trade data at the country and product level allows us to draw a differtiated depiction of bilateral export and import flows and assess the competitive position of single countries. In the case of Germany, there are a numerous indicators suggesting that diversification of the ETG export portfolio is one of the main reasons the country was able stay competitive – that does, however, not necessarily hold true for individual regional markets, thus warranting further investigation.

When interpreting the results, the multiple-use problem is to be kept in mind. Furtthermore, the role of technology costs has to be discussed. Decreasing prices of e.g. PV modules certainly have their impact on the development of the overall ETG trade volume and might explain slower growth rates in certain time periods.

With ETG including technologies still evolving and products of interest not explicitly covered in current statistics (for example grid and storage technology), additional modifications of the set of goods is also desirable in the future. Additionally, the analysis depicted above is limited to trade in goods with trade in services being of similar interest.

References

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