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KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

»» Impacts of the energy transition

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KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Impacts of the energy transition

1. Introduction and main results

Developed as part of a cooperative project of KfW Bankengruppe and the Centre for European Economic Research (ZEW), the *KfW/ZEW CO_2 Barometer* has been analysing the situation of German companies regulated under the European Union Emissions Trading Scheme (EU ETS) on an annual basis since 2009. The study's objective is to closely monitor firm behaviour in carbon markets in order to regularly provide detailed information to policymakers, businesses and the research community. In the framework of the KfW/ZEW CO_2 Barometer, KfW Bankengruppe and the ZEW have developed a second annual survey as a complementary study that started two years ago: the *KfW/ZEW CO_2 Barometer – Manufacturing Industry Edition*. The aim is to shed light on recent developments in the German manufacturing industry that are driven by European climate and energy regulations and the German energy transition in particular. The study is based on a survey among German manufacturing firms. The results are presented in this report which is published subsequent to the *KfW/ZEW CO_2 Barometer – Carbon Edition*. The survey questions in the present version address energy price expectations, investment in energy efficiency and the companies' opinion on the German energy transition. These are the main results of the *KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition*:

- Most of the responding companies' production sites are in Germany. However, one fifth of the respondents (mainly small and medium-sized enterprises (SMEs)) see their major sales market outside of Germany in the next five years.
- A large proportion of responding companies increased their energy efficiency in the last year (40 %). However, regarding the total energy demand, 39 % will consume more energy in the next five years.
- Almost 80 % of the companies (mainly SMEs) report electricity as the most significant driver of energy costs followed by gas (18 %).
- More than 70 % expect electricity, gas, oil and diesel prices to increase until 2020.
- The majority of companies expect the consumption of fossil fuels to decline until 2030.
- Energy efficiency is listed most (67 %) as an opportunity of the energy transition by the companies. In contrast, the nuclear phase-out is classified more often as a risk (29 %) than the other categories. However, the majority of companies consider it an opportunity (49 %).
- Flexibility of electricity demand is seen as an opportunity by only one third of the companies. Ten per cent even classify it as a risk. As the current government proposal aims towards more flexible electricity demand, this seems to be a challenge, especially for SMEs.

The survey covers a broad range of topics addressing energy issues. About 900 German manufacturing companies were invited to participate. In this second interview round, 89 companies responded to the questionnaire. Although the response rate of 9.9 % has increased in comparison to the second and first round of the *KfW/ZEW CO_2 Barometer – Manufacturing Industry Edition* (6.6 and 4.7 %), the survey still cannot be considered representative.

Since 2013, about 70 % of companies participating in the *KfW/ZEW CO_2 Barometer – Manufacturing Industry* were small and medium-sized enterprises (SMEs). Throughout this report, SMEs are defined as companies with an annual turnover of no more than EUR 50 million: small companies with an annual turnover of below EUR 10 million and medium-sized companies with a turnover of between EUR 10 million and EUR 50 million.

The *KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition* is structured as follows:

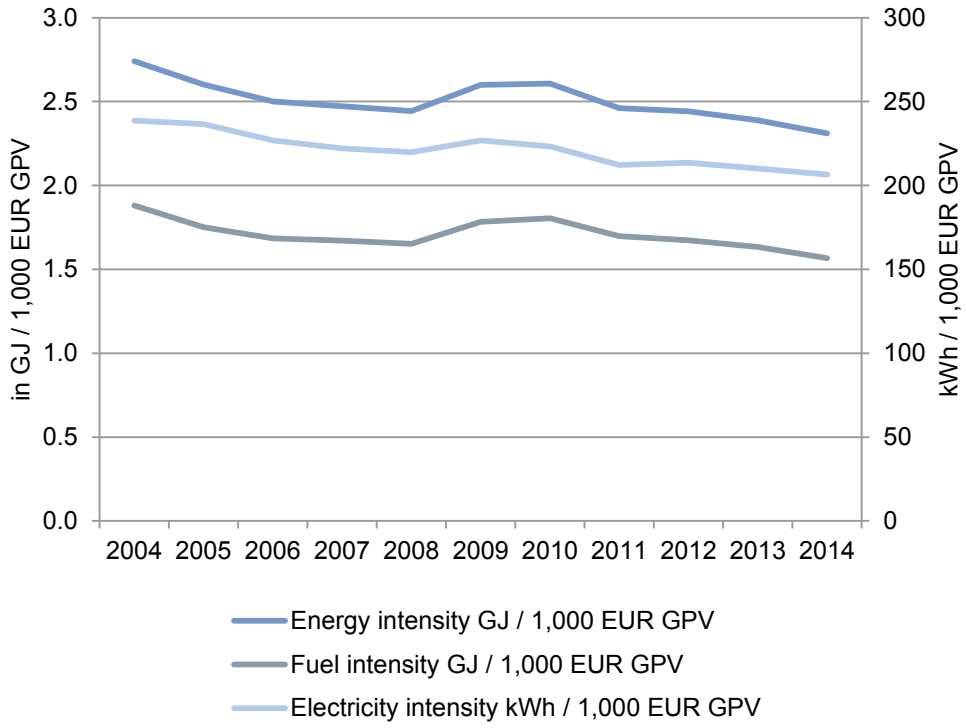
Section 2 gives a short review of recent market and policy developments. Section 3 analyses respondents' current production and sales markets. The respondents' current energy costs and expectations of energy prices are presented in section 4. Finally, companies' opinions on the German energy transition and on energy market developments are described in section 5. Section 6 concludes.

2. Recent market and policy developments

The German energy transition is shaping the German energy landscape and poses challenges for the industry regarding energy supply and costs. The main mid-term targets until 2020 are the reduction of greenhouse gases (GHG) by 40 % against 1990 levels, the reduction of primary energy use by 20 % relative to 2008, the increase of energy productivity by 2.1 % p.a. and raising the share of renewables to at least 35 % in electricity consumption (BMWi, 2014).

In 2014, GHG emission reductions were at 27 % against 1990 levels, indicating that there may be a gap of 5 to 8 percentage points in 2020 unless efforts increase. The reduction of primary energy use is currently (2014) at 9 % relative to 2008. If this development path continues, 2020 targets will be out of reach.

Although the recent one-year (2014 vs. 2013) development of energy efficiency was a successful jump of 3.3 % less energy use per EUR 1000 value of production, the long-term increase in energy efficiency is rather moderate at 1.9 % p.a. since 1990 (AGEB 2015b). Especially concerning the reduction of energy use, Germany is currently lacking behind its targets. Long-term average household and industrial increases in energy efficiency have been even slower at 1.6 % p.a. Over the last ten years, energy and fuel intensity in the industrial sector decreased by 16 and 17 % respectively. Electricity intensity decreased by just 13 % (see Figure 1).



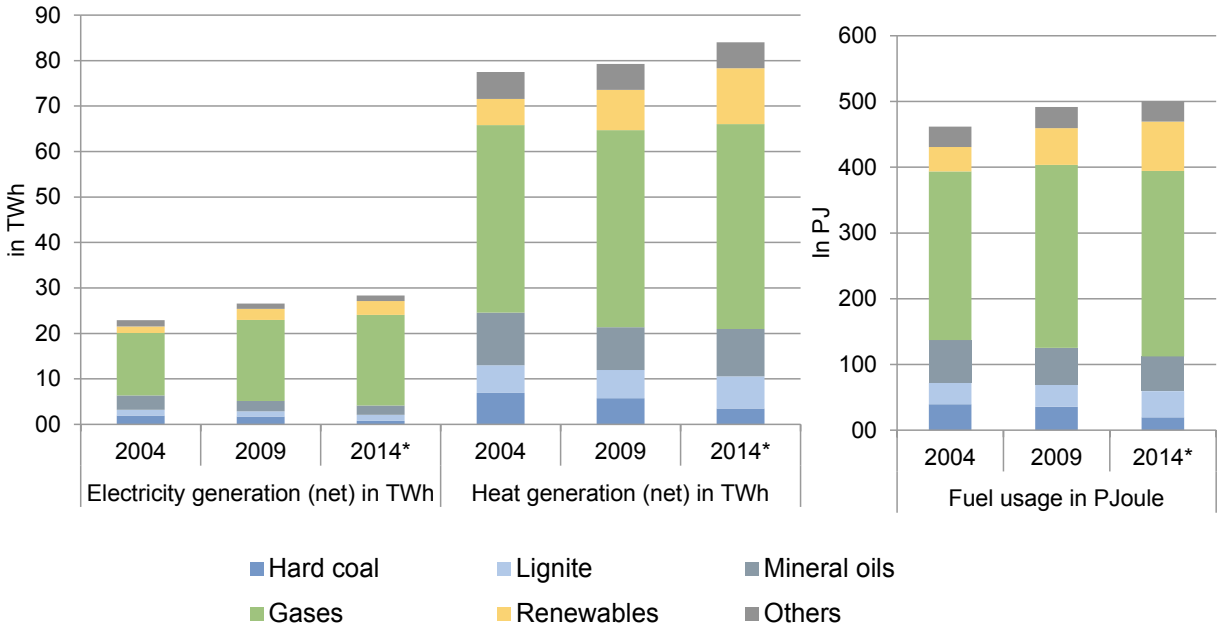
Note: GPV = Gross Production Value

Source: AGEB (2015a)

Figure 1: Industrial energy intensity in Germany

There is still great energy efficiency potential in the industry, especially concerning the use of process heating and the use of mechanical energy, particularly of electric actuators. The improvements in energy productivity have mainly been achieved through the progressively coupled use of electricity and heat generation in combined heat and power systems and the energetic optimisation of production processes (Brüggemann 2015).

Most energy in the industry is used for process heating (see KfW/ZEW 2013). Thereby, industrial combined heat and power (CHP) generation plays a major role. CHP plants have profited from government support over the last ten years. To promote decarbonisation of the German electricity and heat generation, the regulation for CHP will be adapted and a government draft has just been published. No more coal-fired CHP plants shall receive government support. In return, gas-fired CHP plants shall get more support. In addition, the financial support of self-consumers' CHP plants will be abolished because they are expected to be commercial without support. Only smaller plants and those in the energy-intense industry shall get further support because they are assumed not to be profitable otherwise. These changes may also have an effect on the type of CHP plants that will be built and modernised in the coming years. The development of industrial CHP in the last ten years reflects the government promotion: heat and electricity generation increased slightly (see Figure 2). At the same time, a slight trend towards decarbonisation can be observed: the combustion of hard coal has decreased slightly whereas the usage of renewables has more than doubled. Renewables are currently used for about 10 % of industrial heat and electricity generation.



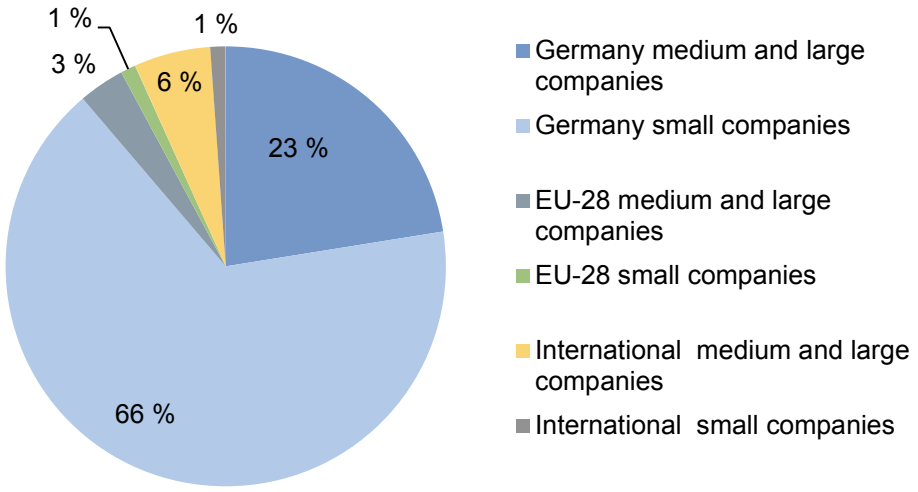
Source: AGEB (2015)

Figure 2: Industrial combined heat and power generation in Germany

3. Production and sales markets

Most (69 %) responding companies are small companies with a revenue of less than EUR 10 million. An additional 21 % are medium-sized companies, i.e. with a revenue of between EUR 10 million and EUR 50 million. Only 10 % of the respondents have a revenue of over EUR 50 million. In terms of employees, only 7 % of the respondents have more than 250 employees. The German distribution of company sizes consists of 0.5 % larger and 12.5 % medium-sized companies. Smaller companies account for 87 % (IfM 2014). In comparison to the German distribution, larger and medium-sized companies are rather overrepresented in the sample with 10 and 21 % respectively.

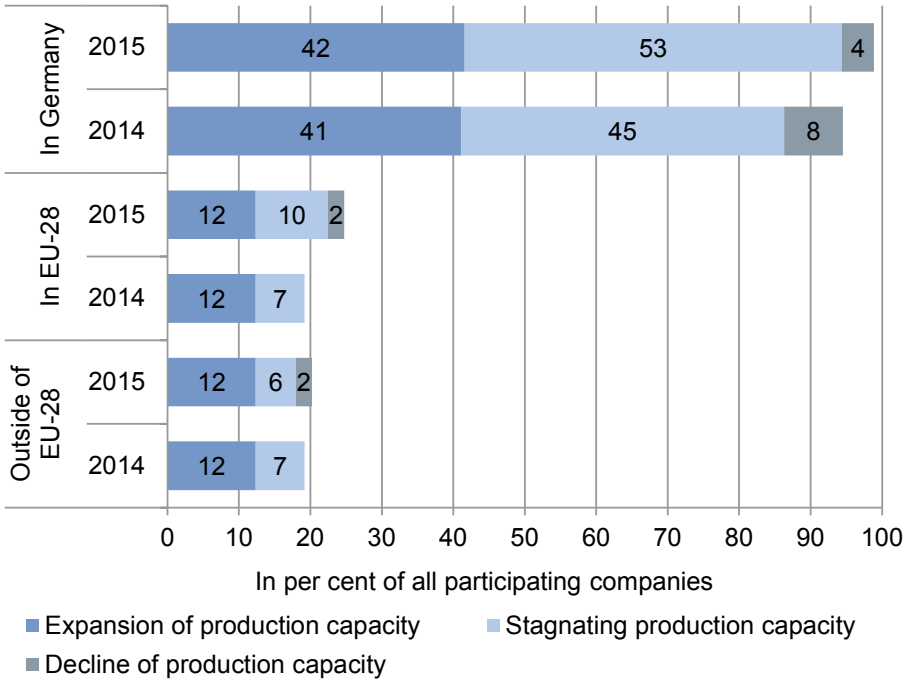
Germany is the main production region for most respondents (89 %) (see Figure 3). In comparison to smaller companies, relatively more medium and large companies seem to produce in the EU-28 (3 vs. 1 %) and internationally (6 vs. 1 %) (mostly in addition to German production). Smaller companies are rather active on German markets.



Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 3: Main production site in 2014

Hence, in the next five years, expansion of production sites by participating companies is mainly planned to take place in Germany. Nevertheless, the largest proportion of those manufacturing companies active outside of Germany is planning to expand their production abroad. Hence, international orientation and expansion activities are pursued simultaneously by companies. A comparison with last year's responses does not show a significant change in this trend (see Figure 4).

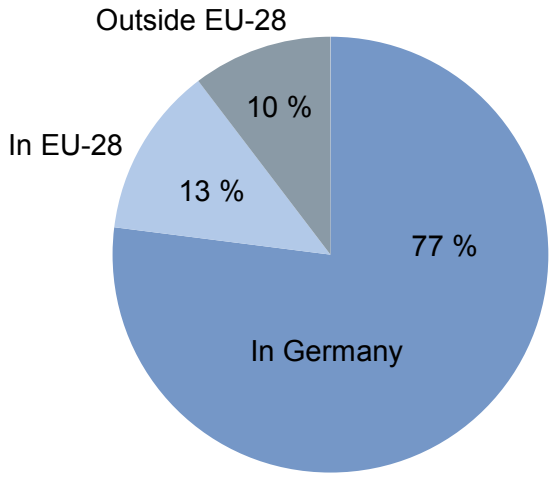


Note: Does not add up to 100 per category because some companies did not respond within the respective category (the different regions).

Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 4: Development of production sites in the next five years

For the majority of the manufacturing industry respondents (77 %), Germany will remain the most important sales market. Nonetheless, one fifth of the participating companies see their potential sales markets outside of Germany, i. e. 13 % in the EU-28 and 10 % even outside the EU (see Figure 5).

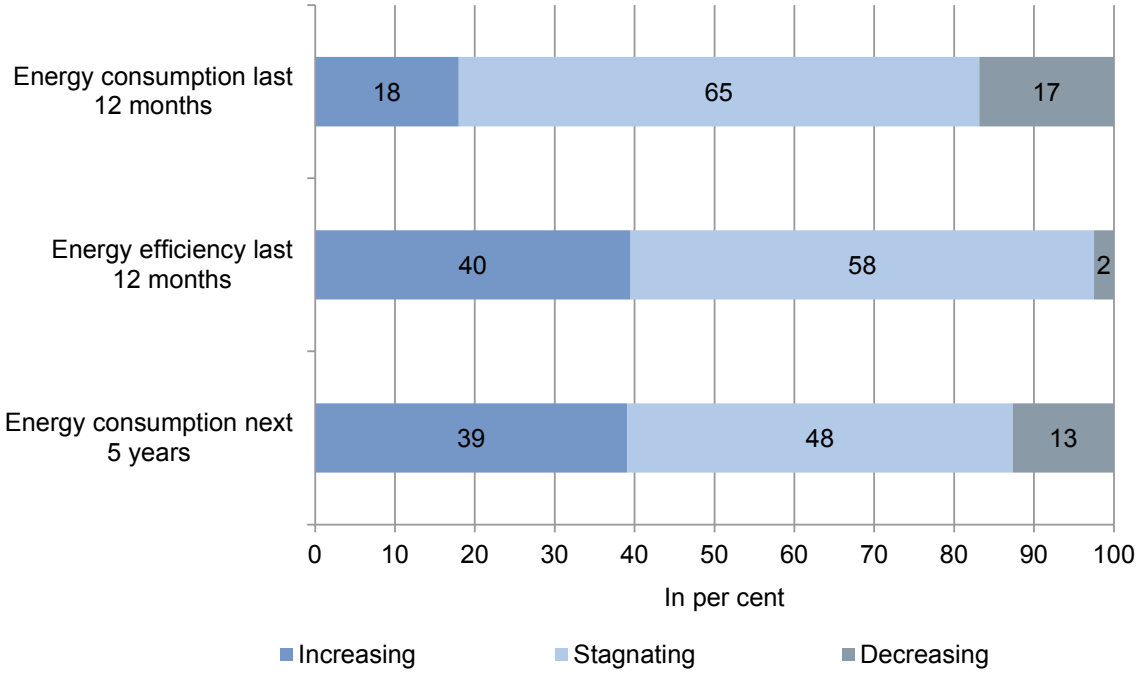


Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 5: Development of sales market in the next five years

4. Energy efficiency and energy costs

On the one hand, 40 % of the responding companies reported increasing energy efficiency during the last 12 months, but on the other hand, only 17 % decreased their total energy consumption. At the same time, 18 % reported increasing energy consumption in that period and 39 % even expect additional energy consumption in the next five years (see Figure 6). As a result, energy consumption is expected to increase rather than decrease. Hence, despite significant increases in energy efficiency, the energy consumption of the industrial sector may rise. Referring to Germany's targets, their achievement seems challenging, especially for the industrial sector. Although energy productivity seems to rise in the industrial sector (target for all sectors: 2.1 % p.a. 2008 to 2050), the reduction of industrial primary energy use seems to be a major undertaking (target for all sectors: -20 % by 2020).

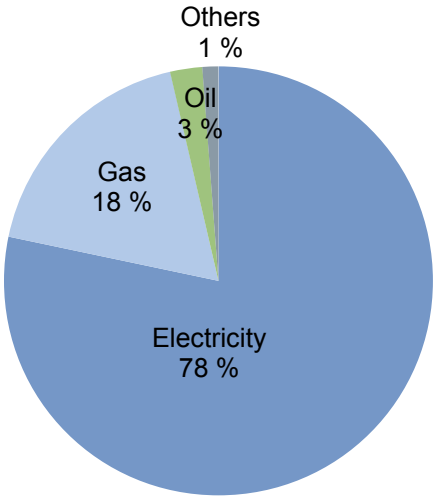


Note: Percentages may not add up to 100 due to rounding.

Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 6: Energy consumption and energy efficiency

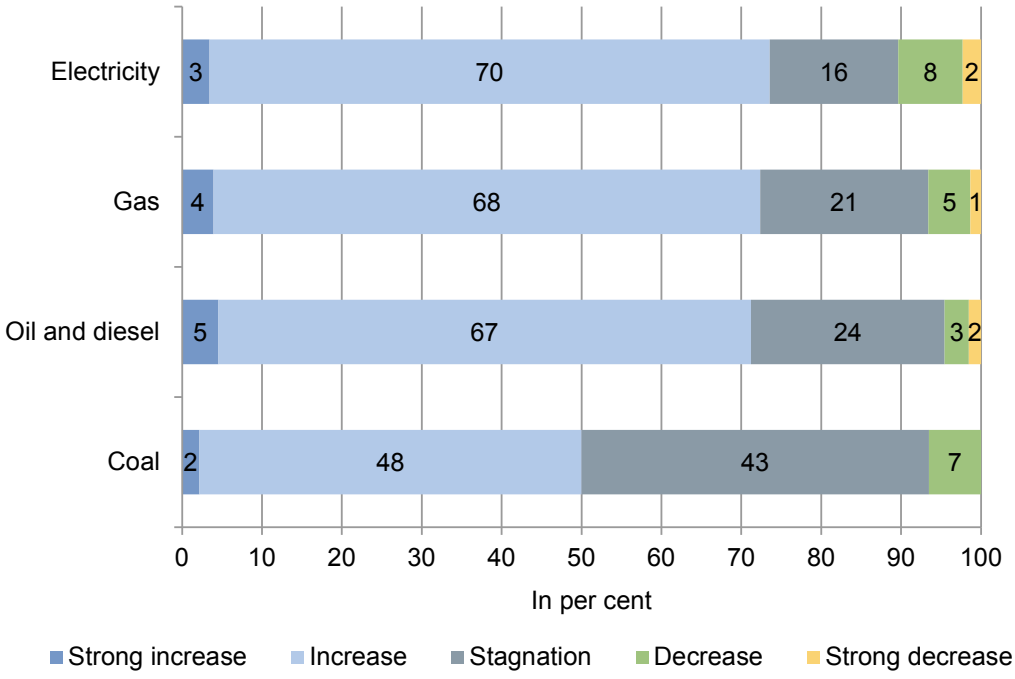
The major incentives for companies to increase energy efficiency are mainly the improvement of production processes and the reduction of energy costs. For the responding manufacturing companies, which are mainly SMEs, electricity is by far the most important energy cost driver (78 %) followed by gas (18 %, see Figure 7). Most SMEs are not exempt from the EEG levy and, as it has increased significantly over the last years, their electricity costs followed this upward path (see KfW/ZEW 2014).



Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 7: Which is the energy carrier with the highest energy cost burden?

Most companies (more than 70 %) expect electricity, gas, oil and diesel prices to increase until 2020. The only different trend is expected for coal: 50 % expect coal prices to either stagnate or even decrease (see Figure 8). Hence, due to these price signals, coal may continue to be a comparatively cheap energy carrier for the industry, which may have negative impacts on industrial GHG emissions.



Note: Percentages may not add up to 100 due to rounding.

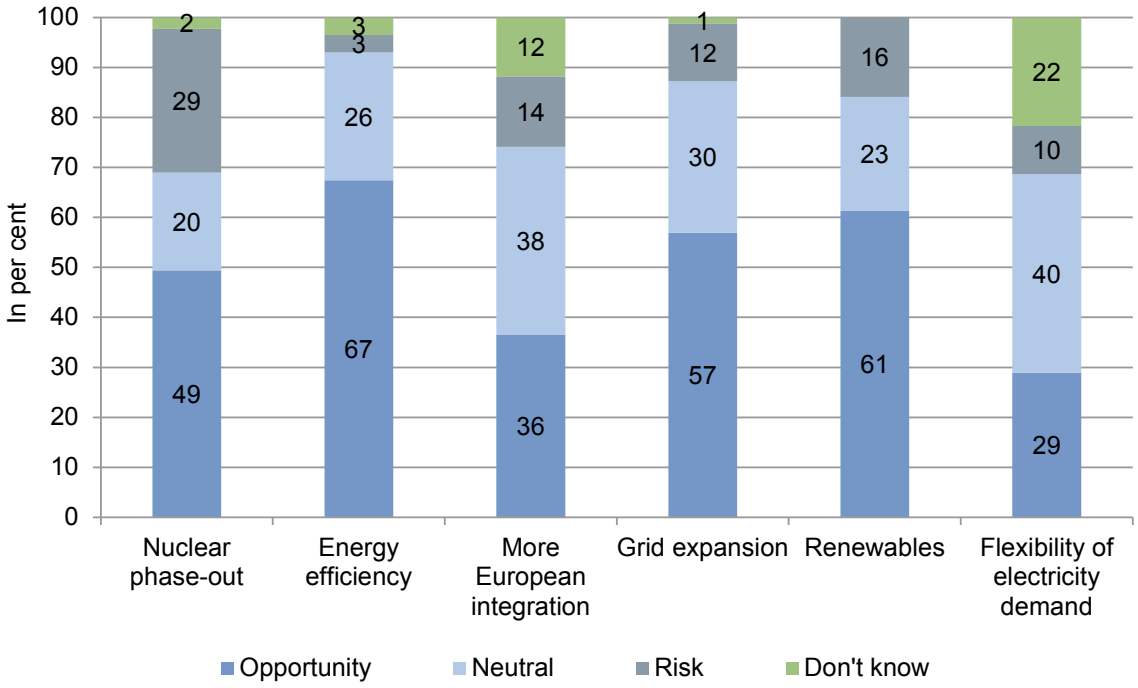
Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 8: Expected price changes until 2020

5. Energy transition and demand flexibility

The manufacturing companies have been surveyed on their opinion on the German energy transition to assess their sentiments towards political targets. Energy efficiency is considered to be an opportunity by most of the companies (67 %) followed by the expansion of renewables and the grid. Although more companies (49 %) see the nuclear phase-out as an opportunity, almost one third of the companies report it to be a risk. This could be due to expected negative impacts on the security of electricity supply as aresult of the nuclear phase-out or because the occurring difficulties concerning permanent storage for nuclear waste are currently under public discussion.

According to the European Commission (2015), a fully integrated internal energy market could achieve economic benefits of up to EUR 40 billion a year. However, more European integration is listed as an opportunity by only 36 % of the companies and 14 % even report it to be a risk. An increasingly decentralised electricity market, in which industrial consumers' demand is increasingly flexible, is one important aspect of the government proposal for an electricity market design (White Book, BMWi 2015). This seems to be a major challenge, especially for the SMEs responding to the survey: Less than one third see flexibility of electricity demand as an opportunity and 10 % even view it as a risk. As surprising percentages of companies do not know how to classify European integration and flexibility of demand, the economic benefits have possibly not yet been recognized (see Figure 9).



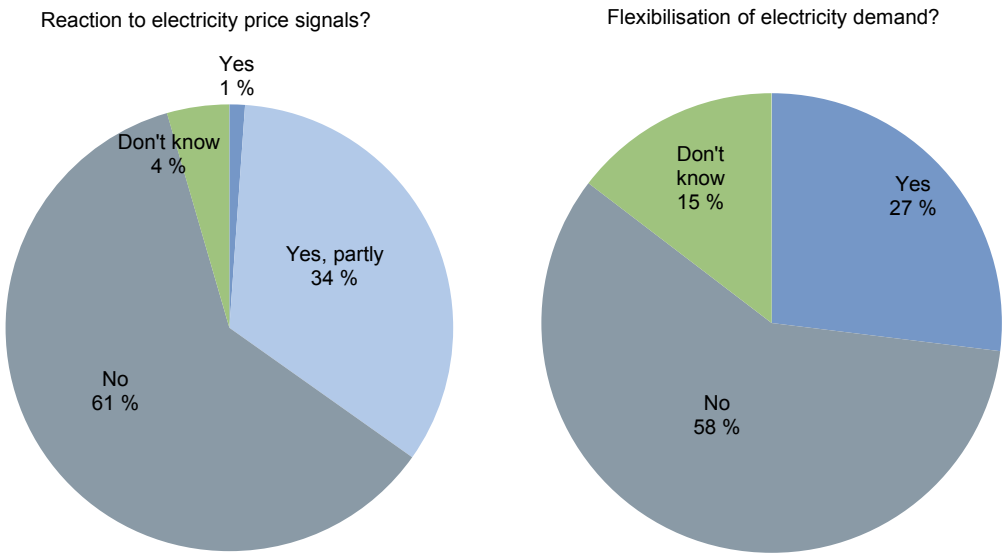
Note: Percentages may not add up to 100 due to rounding.

Source: KfW/ZEW CO_2 Barometer 2015 – Manufacturing Industry Edition

Figure 9: Assessment of the energy transition

To be able to benefit from the flexibility of electricity demand, companies need the technical capacities to quickly respond to electricity price signals. About one third of the responding manufacturing companies report that they could react to electricity price signals and adapt

their demand. In addition, 27 % of the companies responded that they intend to make their electricity demand more flexible in the future. Nevertheless, the majority (61 %) of respondents did not react to price signals and is not planning to increase their flexibility of electricity demand (59 %, see Figure 10).

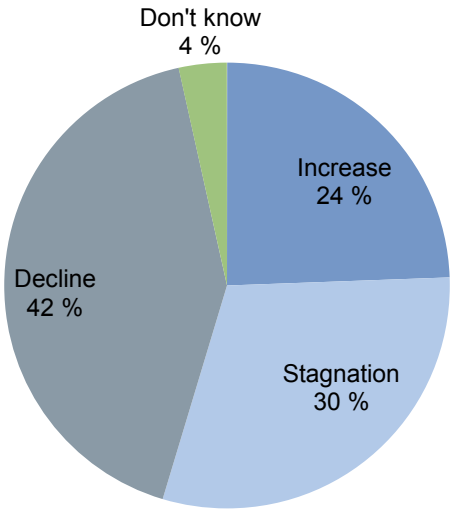


Note: Percentages may not add up to 100 due to rounding.

Source: KfW/ZEW CO_2 Barometer 2014 – Manufacturing Industry Edition

Figure 10: Reaction to electricity price signals

The general development of fossil fuel consumption is an increasingly important issue, especially just a couple of months before the Paris Climate Conference, COP21. The majority of respondents' expectations support a low carbon path: 42 % anticipate declining fossil fuel consumption until 2030. Only about one quarter of the companies expect an increase in fossil fuel consumption (see Figure 11).



Source: KfW/ZEW CO_2 Barometer 2014 – Manufacturing Industry Edition

Figure 11: Expectations on the general development of fossil fuel consumption until 2030

6. Conclusion

German manufacturing companies have to face different challenges in the energy transition as energy supply is changing towards more renewable energies and electricity costs are increasing. At the same time, energy efficiency shall be increased and energy consumption reduced. Almost 70 % of responding companies were SMEs, which are confronted with higher energy costs due to fewer exemptions. In addition, they very often have less financial means to invest in energy efficiency. Most of the respondents have their major production sites in Germany. Nevertheless, one fifth sees their major sales market outside of Germany in the next five years and the competitiveness of German production will, therefore, be important.

Almost 80 % of the companies report electricity as the most significant driver of energy costs and more than 70 % expect electricity, gas, oil and diesel prices to increase until 2020. At the same time, the majority of companies expect general fossil fuel consumption to decline until 2030.

A large proportion of companies is increasing their energy efficiency but will continue to consume more energy. Hence, decreasing industrial primary energy use as a political target remains a serious undertaking. Energy efficiency is, however, classified as an opportunity of the energy transition by most of the respondents.

Since energy costs are increasing, energy efficiency is a major driver of competitiveness: companies seem to see this opportunity. Nevertheless, further promotion and prevention of market failure, such as information asymmetries or financing constraints, is necessary to support energy efficiency and thereby the German industry, especially SMEs.

Flexibility of electricity demand is seen as an opportunity for only one third of the companies. Ten per cent even consider it as a risk. As the current government proposal aims towards more decentralised and flexible electricity supply and demand, this also seems to be a challenge, especially for SMEs.

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