

Innovation activities of renewable power generation technology providers in Germany



GRETCHEN Survey 2014 *Descriptive results*

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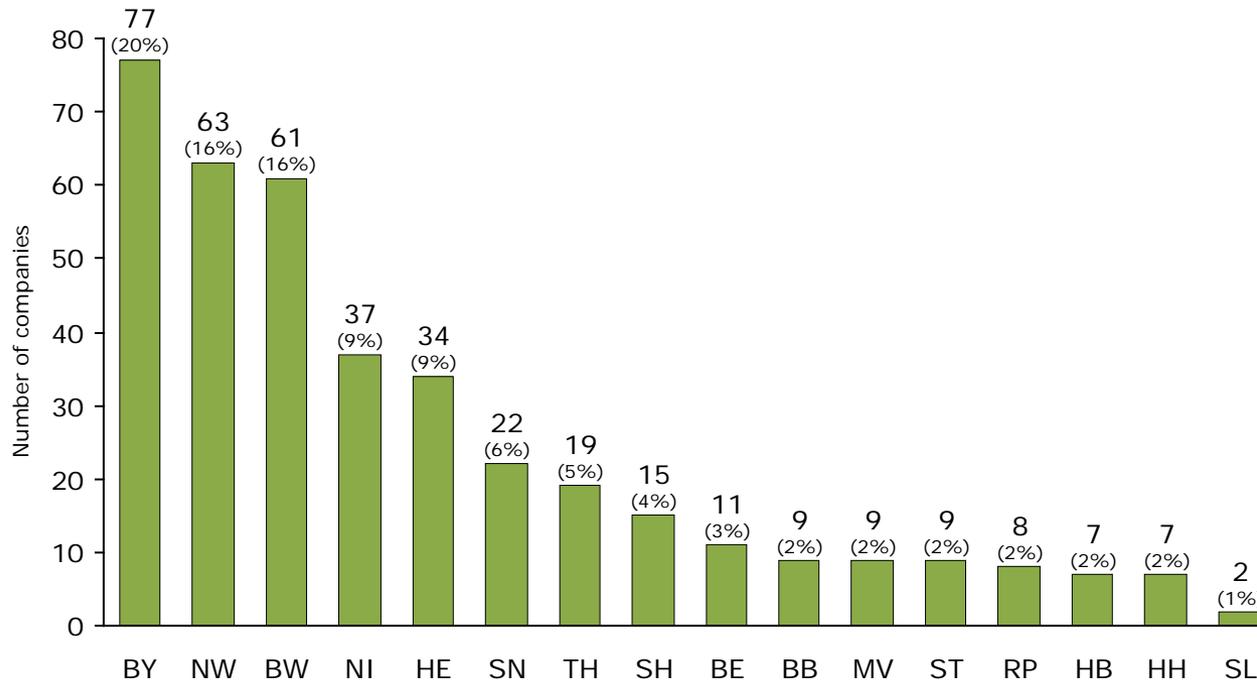


Contact: Dr. Karoline S. Rogge

October 20, 2015

Participating companies: Geographical location

Participating companies by Federal State (n=390)



BW	Baden-Württemberg
BY	Bavaria
BE	Berlin
BB	Brandenburg
HB	Bremen
HH	Hamburg
HE	Hesse
MV	Mecklenburg-West Pomerania
NI	Lower Saxony
NW	North Rhine-Westphalia
RP	Rhineland-Palatinate
SL	Saarland
SN	Saxony
ST	Saxony-Anhalt
SH	Schleswig-Holstein
TH	Thuringia

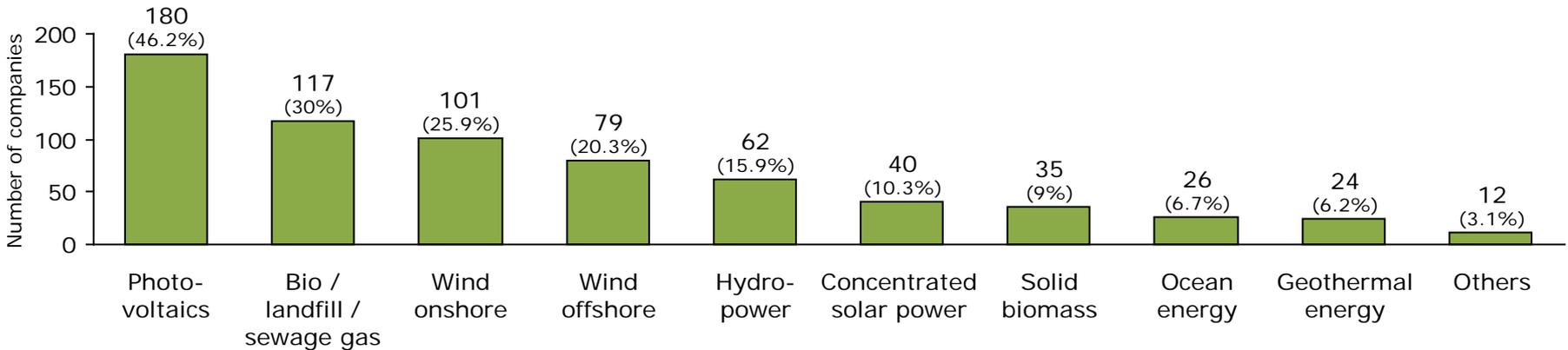
- More than half of the companies (51.5%) are located in the three States of BY, BW und NW.
- The four states of NI, HE, SN and TH are home to another 28.7% of companies.

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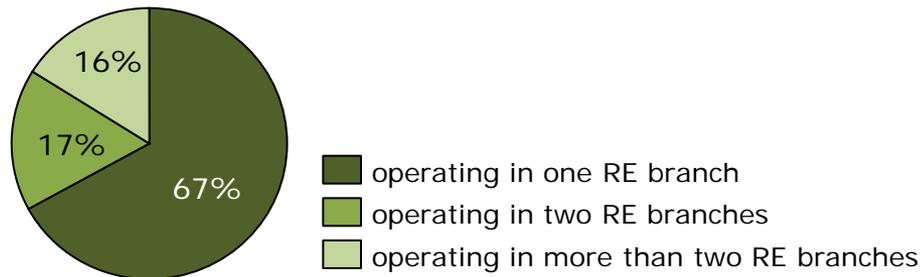
Participating companies: Technological portfolio

Renewable power generation technologies for which companies supply products

(n=390 – multiple answers possible)



Number of RE branches per company (n=390)

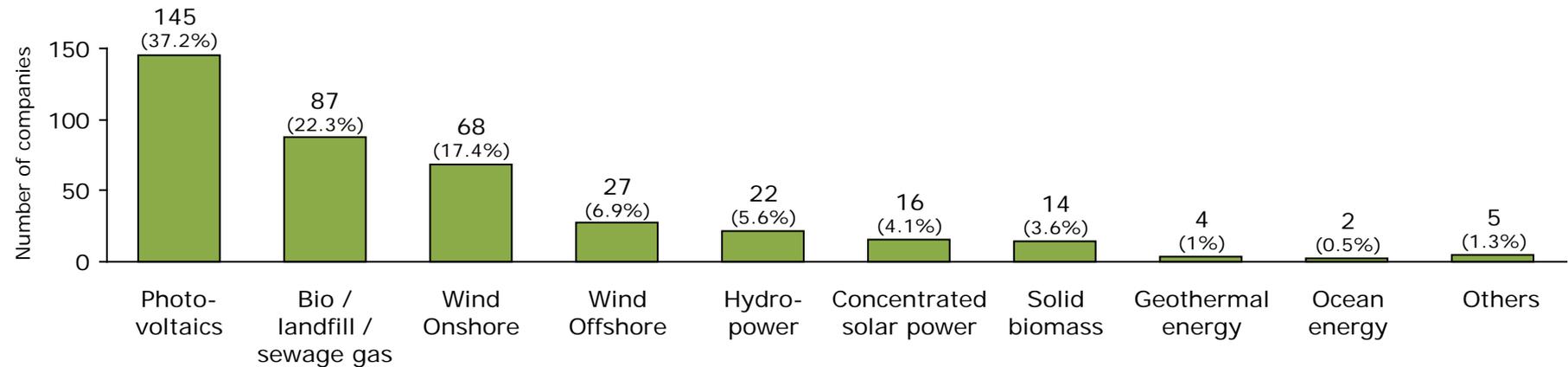


- Photovoltaics is the most common technology: in the portfolio of 46.2% of the companies.
- Biomass/-gas, onshore wind, offshore wind and hydropower rank in the middle.
- Two thirds of the companies are active in one RE branch; the others in two or more.

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Participating companies: Main technologies

Technologies for which survey was completed (n=390)



- The survey was carried out for one specific renewable energy (RE) branch.
- More than half of the responses concerned PV (37.2%), biogas (22.3%) and onshore wind (17.4%).

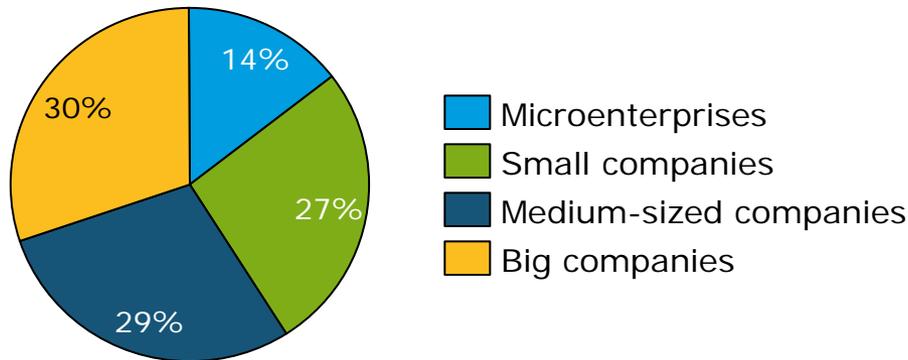
For technology-specific evaluations the following technologies were aggregated:

- Bioenergy = Biogas, landfill and sewage gas, solid biomass
- Other renewables / other = CSP, geothermal energy, ocean energy and others

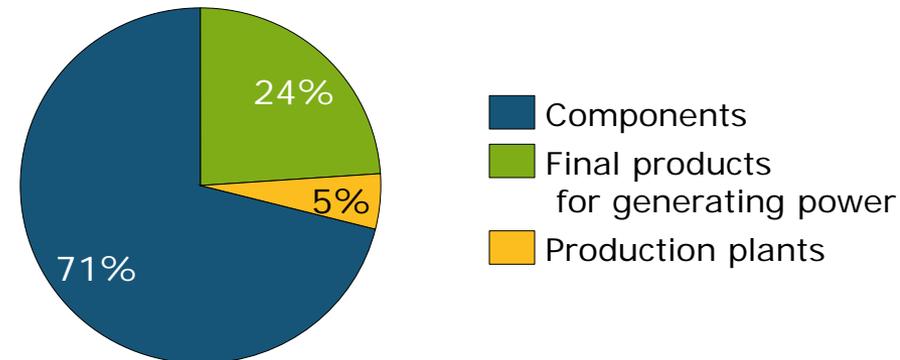
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Participating companies: Size and product type

Size (n=381)



Product type (n=386)



- Approx. 70% of the companies are SMEs.
- In 2013, on average about 50% of total sales were generated by sales of the analyzed RE branch, but this figure varies a lot.
- Most companies focus on producing components to manufacture final products for generating power (71%).

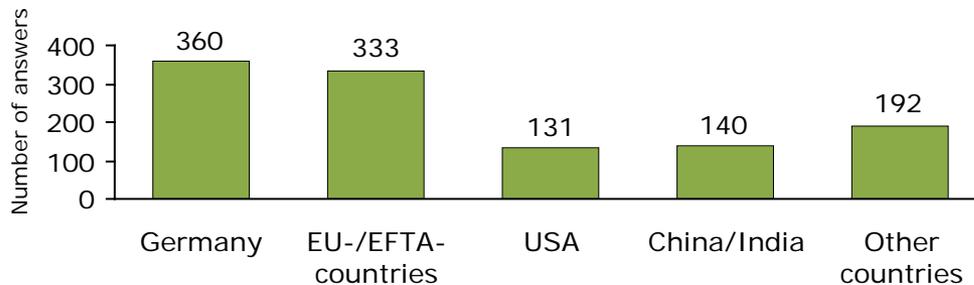
LEGEND	Microenterprises	Small enterprises	Medium-sized enterprises	Large enterprises
Turnover:	up to €2 million	up to €10 million	up to €50 million	more than €50 million
Employees:	up to 9 persons	up to 49 persons	up to 249 persons	more than 249 persons

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Participating companies: Markets and innovation

Geographic markets of the last three years (2011-13) for RE products

(n=390 – multiple answers possible)



- In 2013, on average 39.5% of sales were exports (n=343).
- Only 11.1% (43 von 387) of companies operated exclusively on the domestic market.

Focus of innovation activities over the three years (2011-13)...

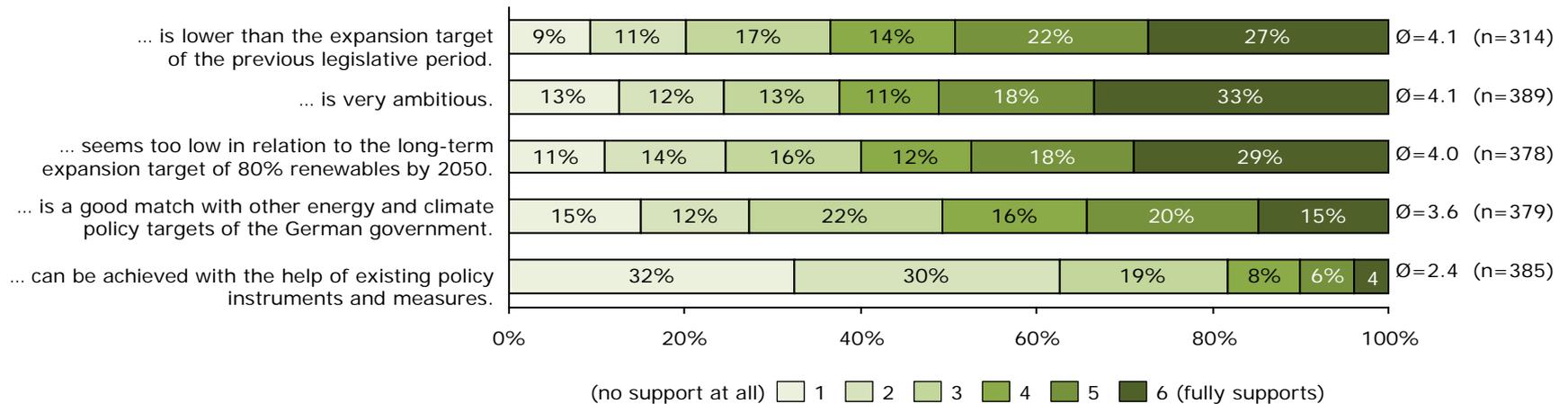
- Companies orient their innovation activities equally towards the German and the global market.



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Policy Mix: Expansion targets for renewables

Germany's target for expanding the share of renewable energies to 40-45 percent of power generation up to 2025...

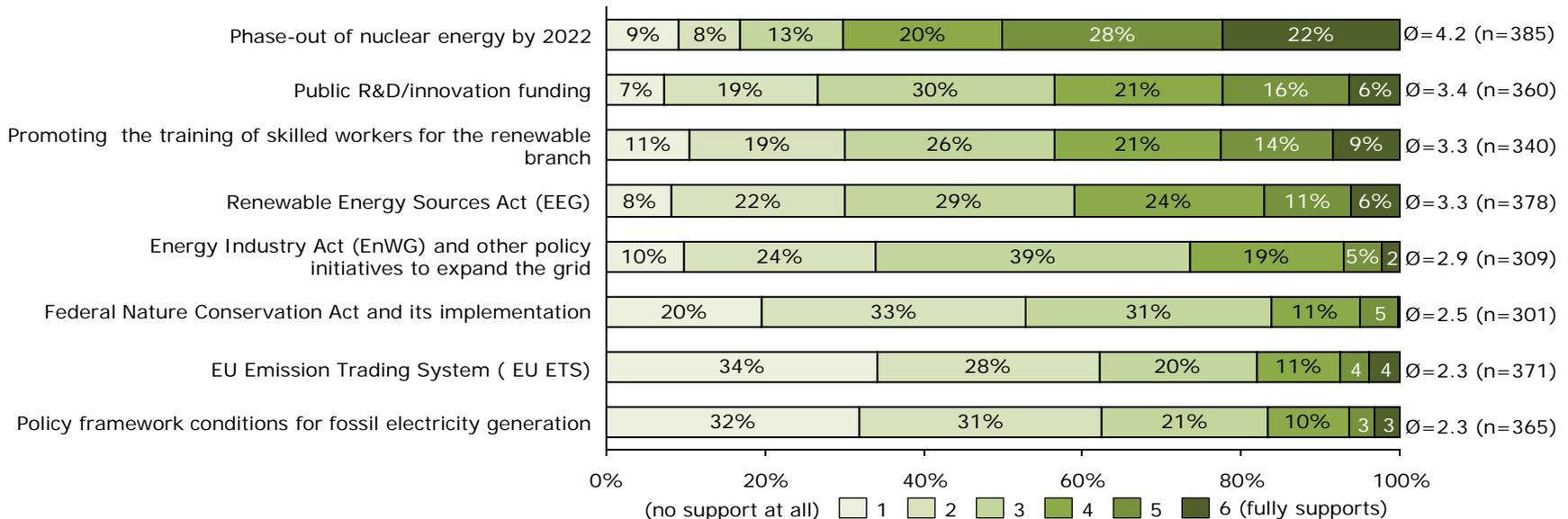


- Germany's 2025 expansion target of 40-45% power generation from renewable energies is regarded as ambitious, but the existing instruments and measures appear insufficient to achieve the target.
- In addition, the 40-45% target for 2025 is regarded as not ambitious enough in light of the 80% expansion target for 2050.

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Policy Mix: Instruments and measures

Support of the expansion of renewable electricity generation through:

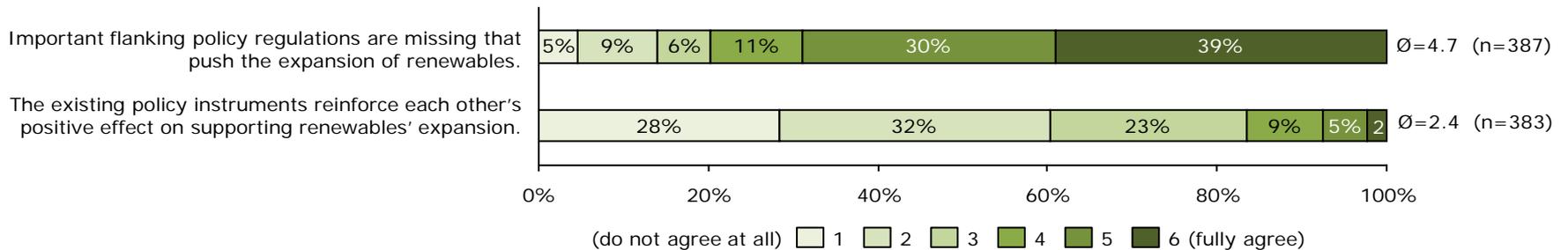


- Nuclear phase-out supports the expansion of renewable energies the most, whereas the EU Emission Trading System seems to have little effect.
- The policy framework conditions for fossil electricity generation are viewed as critical as well.
- Public R&D funding, training skilled workers and the EEG are considered equally important instruments for the expansion of renewable energies.

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Policy Mix: Interplay of instruments

Assessment of the interaction of policy instruments to promote renewable power generation in Germany



- More than two thirds of companies criticize the lack of important flanking policy instruments that push the expansion of renewable energies.
- Apparently existing policy instruments could be substantially better coordinated to generate greater synergy effects for the expansion of renewable energies.

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Policy Mix: EEG and innovation

Influence of the EEG on innovation activities in the three years (2011-13)

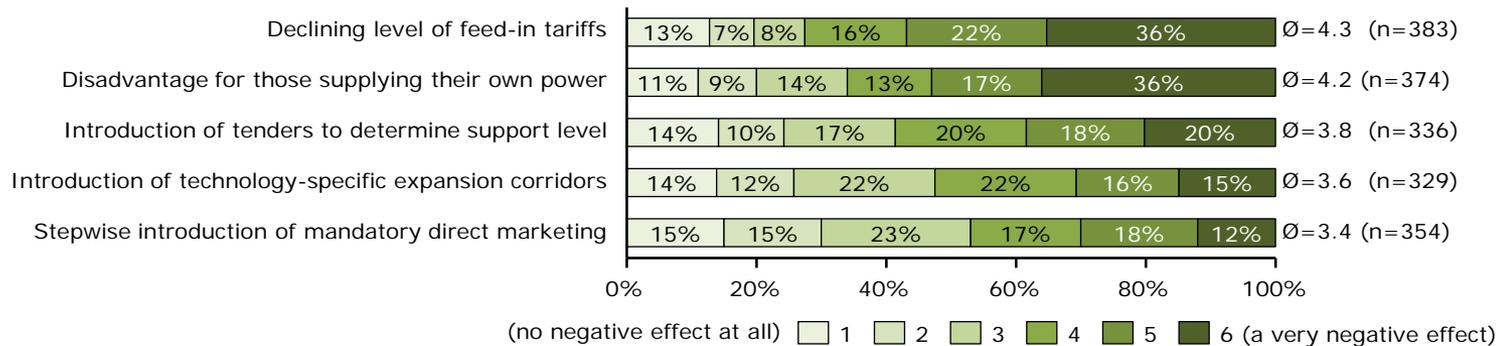


- In particular, the guaranteed payment period and the level of feed-in tariffs in the EEG had a relatively large influence on companies' innovation activities (2011-2013).
- But the annual degredation of feed-in tariffs probably also had a positive impact on corporate innovation activities.

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Policy Mix: EEG 2.0 and markets

Assessment of the negative effects of the German Renewable Energy Sources Act 2014 (EEG 2.0) on the German market

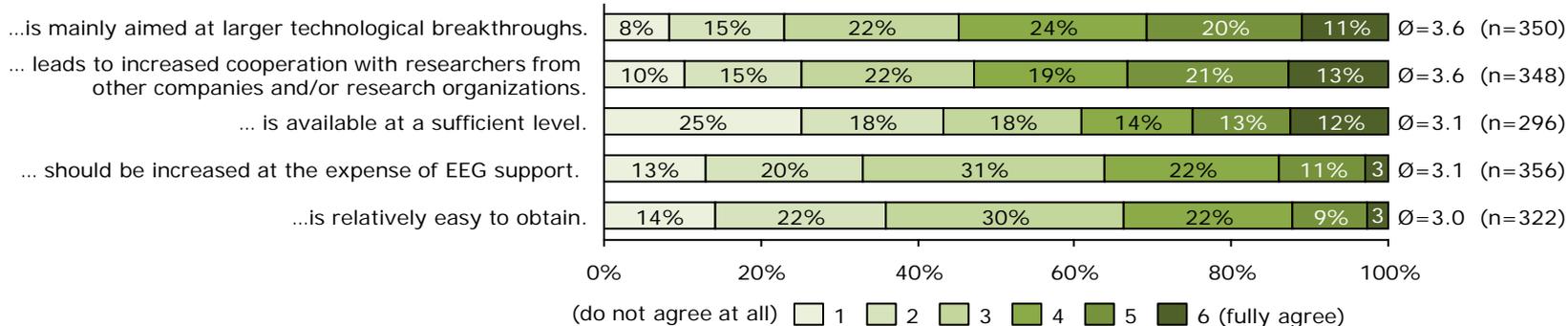


- It is expected that the decline of feed-in remuneration and the disadvantage for those supplying their own power stipulated in the EEG 2.0 will have a particularly negative influence on the German RE market.
- Introducing tenders is viewed skeptically as well.
- The introduction of direct marketing is considered to have the least negative impact on the German RE market.
- The introduction of technology-specific expansion corridors is viewed as particularly problematic by manufacturers of products for bioenergy, PV and onshore wind.

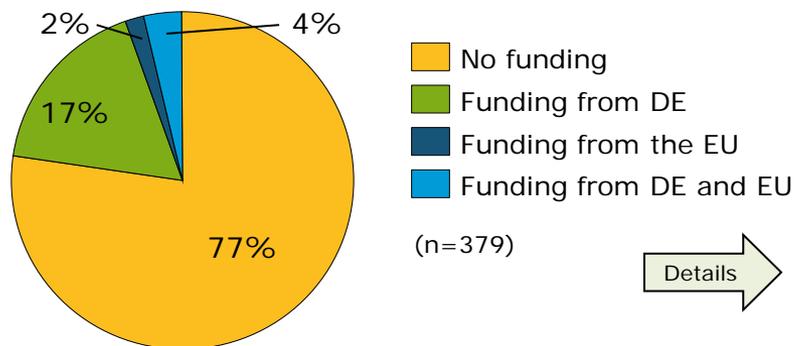
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Policy Mix: R&D and innovation funding

The public R&D/ innovation funding for renewable energies in Germany...



Percentage of companies that received public funding for R&D and innovation projects in the RE branch between 2011 and 2013

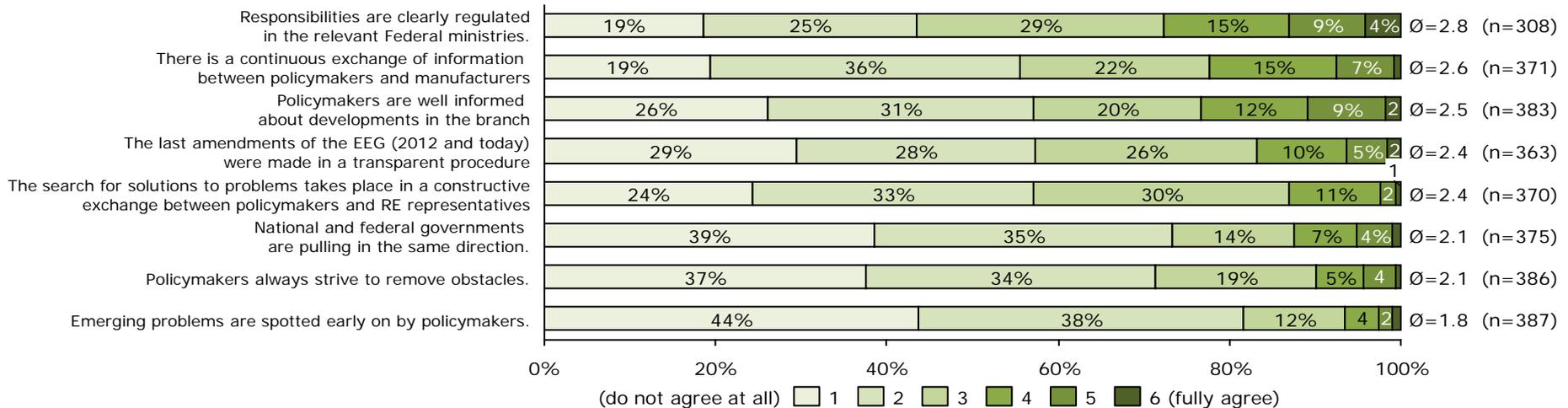


- About a quarter of the companies received public funding for their R&D projects in the RE branch from 2011-13.
- In total, R&D funding from Germany was higher than from the EU.
- Redirecting EEG funds towards more R&D funding is viewed with skepticism.

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Policy Mix: Political processes

Assessments of responsibilities, exchange of information, solutions to problems and transparency in 2014

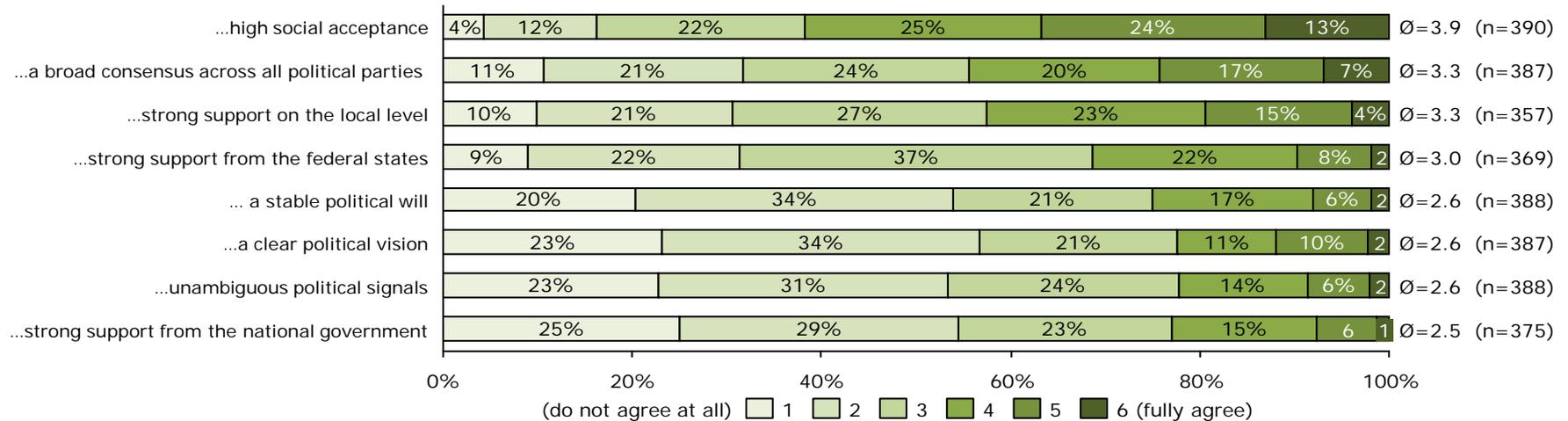


- The vast majority of companies is rather dissatisfied with policymaking processes.
- The strongest criticisms are that problems are not spotted early on, obstacles are not always removed and problem solving rarely involves a constructive exchange between policymakers and RE representatives.
- EEG amendments could have been more transparent and responsibilities could be regulated more clearly.
- National and federal governments do not seem to be pulling in the same direction.

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Policy Mix: Policy framework conditions

Concerning the increase of electricity generation from renewable energies in Germany, there is ...

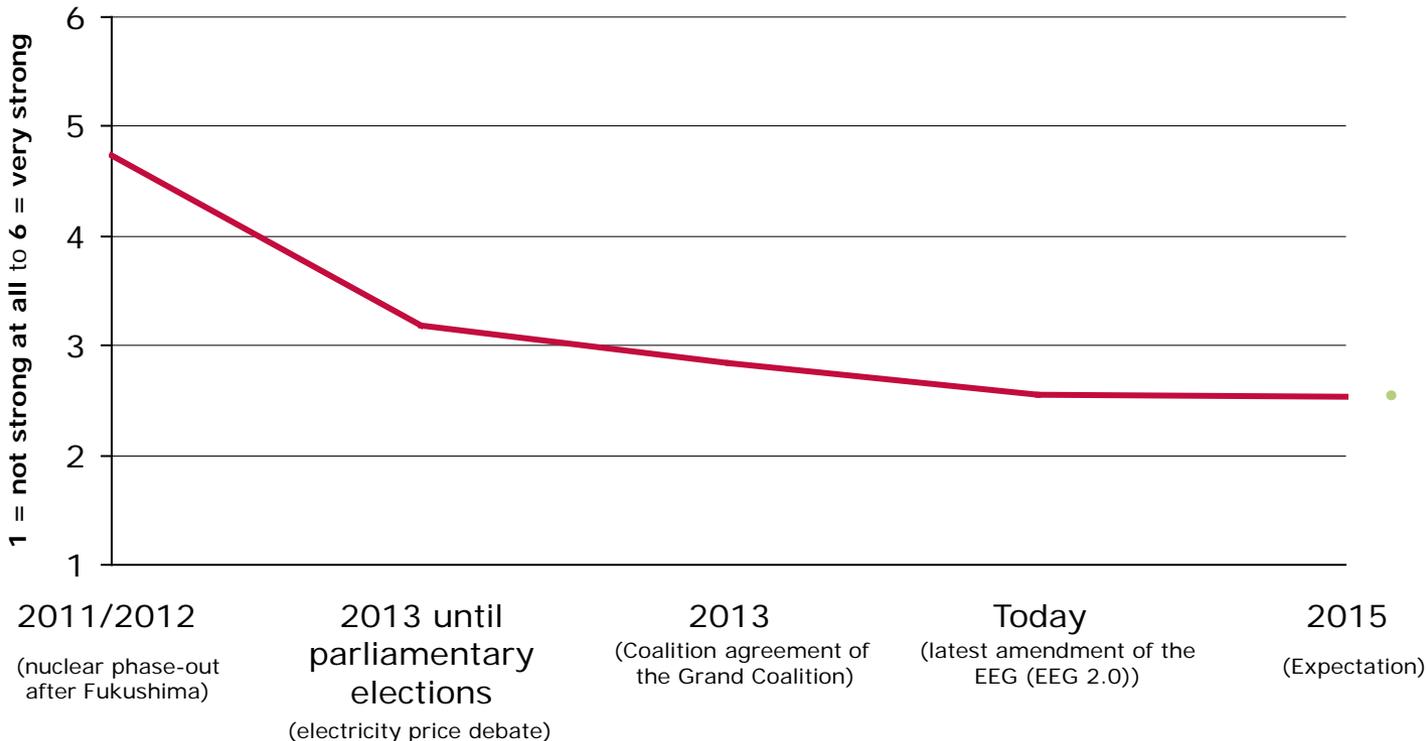


- The social acceptance of power generation from renewables is considered to be very high.
- Companies also acknowledge a broad consensus across all political parties for the expansion of electricity generation from renewable energies.
- However, companies are missing a stable political will and a clear political vision regarding the increase of electricity generation from renewable energies, which is also apparent in their reservations concerning the strength of government support.

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Policy Mix: Change in political will (1)

Strength of the respective German government's political will at five points in time regarding the promotion of renewable electricity generation – across all technologies... (n=368)



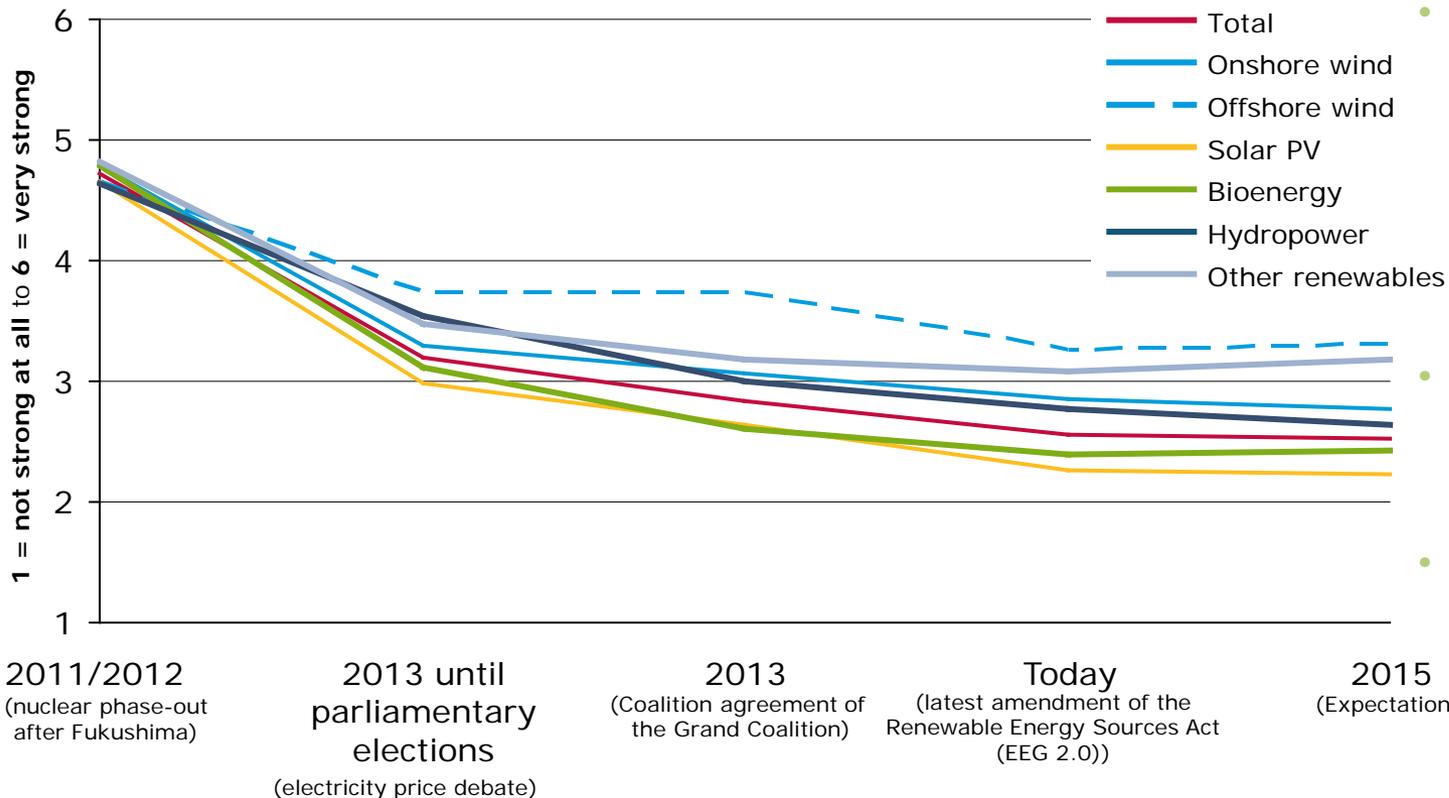
- The perceived political will to expand renewable power generation was at its peak during the nuclear phase-out after Fukushima and has decreased ever since.
- In 2014/2015, some stabilization could be observed, albeit at a low level.

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Policy Mix: Change in political will (2)

... and the political will of the German government as perceived by different RE branches

(n=368)



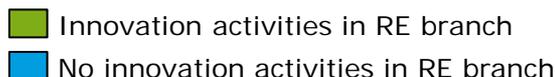
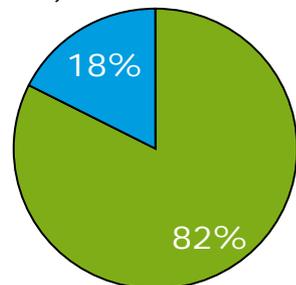
- In 2011/12 the political will to expand RE was assessed as equally strong across all RE branches – this view has diversified since then.
- The political will is perceived to be strongest by offshore wind.
- PV and bioenergy are at the other end of the spectrum.

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Innovation: Activities in 2011-2013

Percentage of companies with innovation activities in the RE branch in the three years (2011-13)

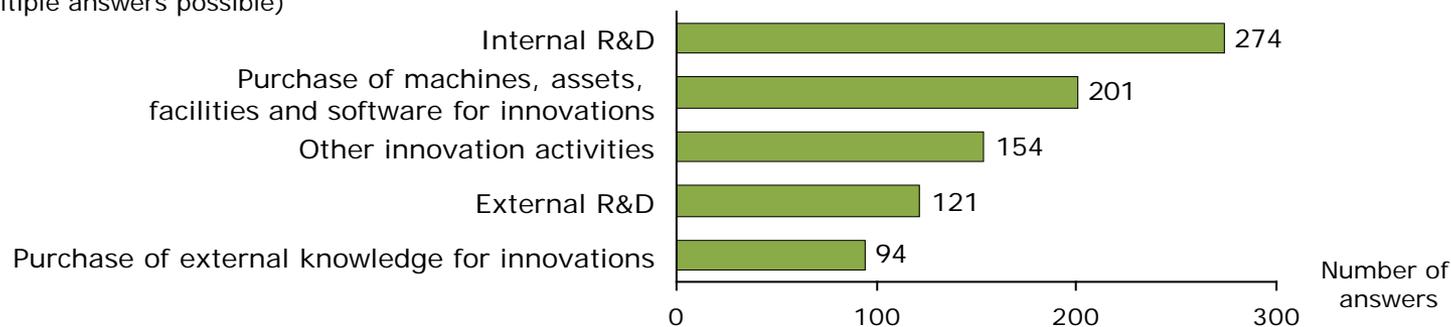
(n=371)



- More than 80% of companies engaged in innovation activities in these three years.
- Strong focus on internal R&D activities.
- Purchasing external knowledge and commissioning external R&D activities only relevant for one quarter of companies.

Type of innovation activities performed in the three years (2011-13)

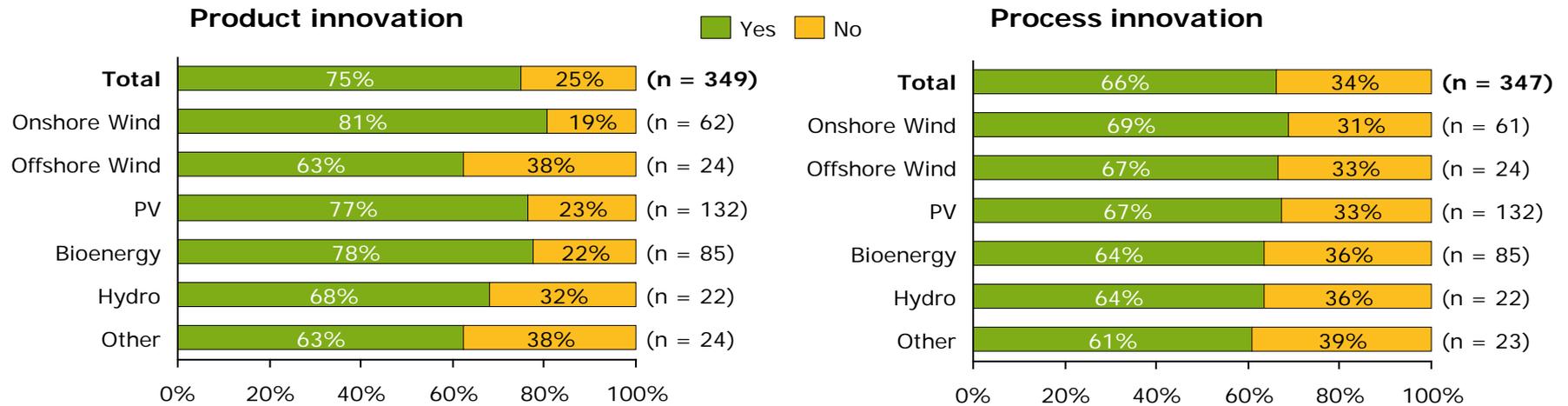
(n=371 – multiple answers possible)



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Innovation: Product vs. process innovations

Introduction of new or significantly improved products and processes in the RE branch in the three years (2011-13)



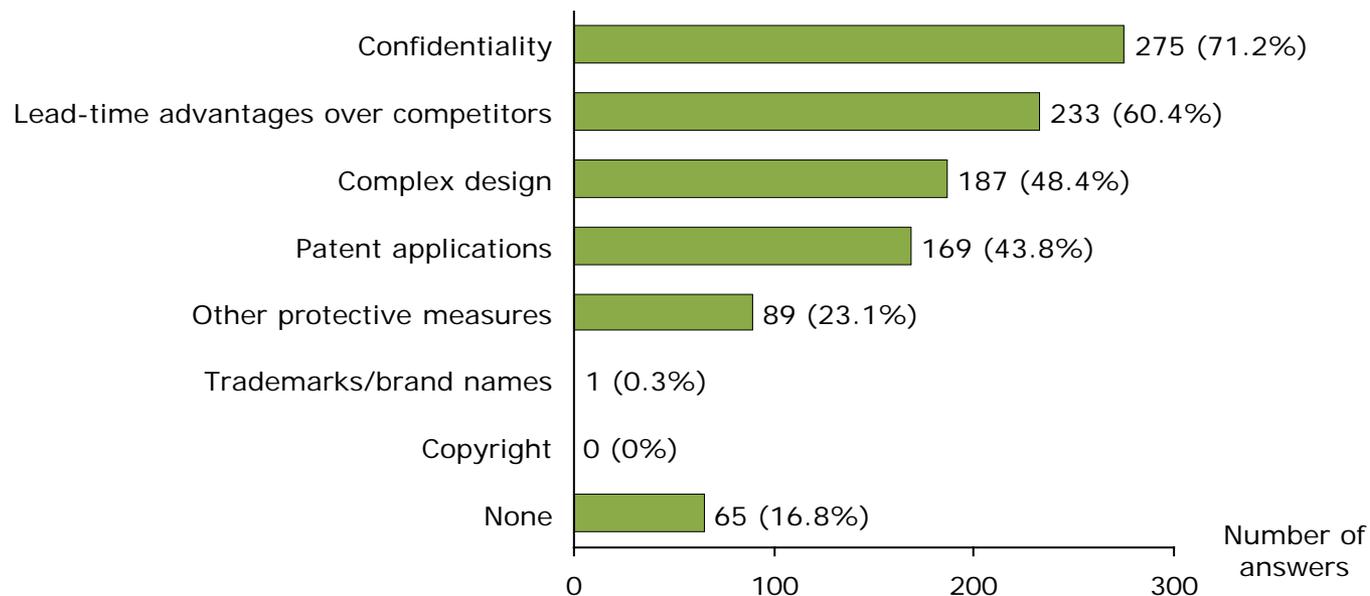
- Three quarters of companies introduced product innovations in this period; two-thirds introduced process innovations.
- Onshore wind, bioenergy and PV had an above average share of product innovations.
- In contrast, the share of process innovations is roughly the same across all RE technologies.

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Innovation: Protection of intellectual property

Measures used to protect intellectual property in the RE branch in the three years (2011-13)

(n = 386 – multiple answers possible)

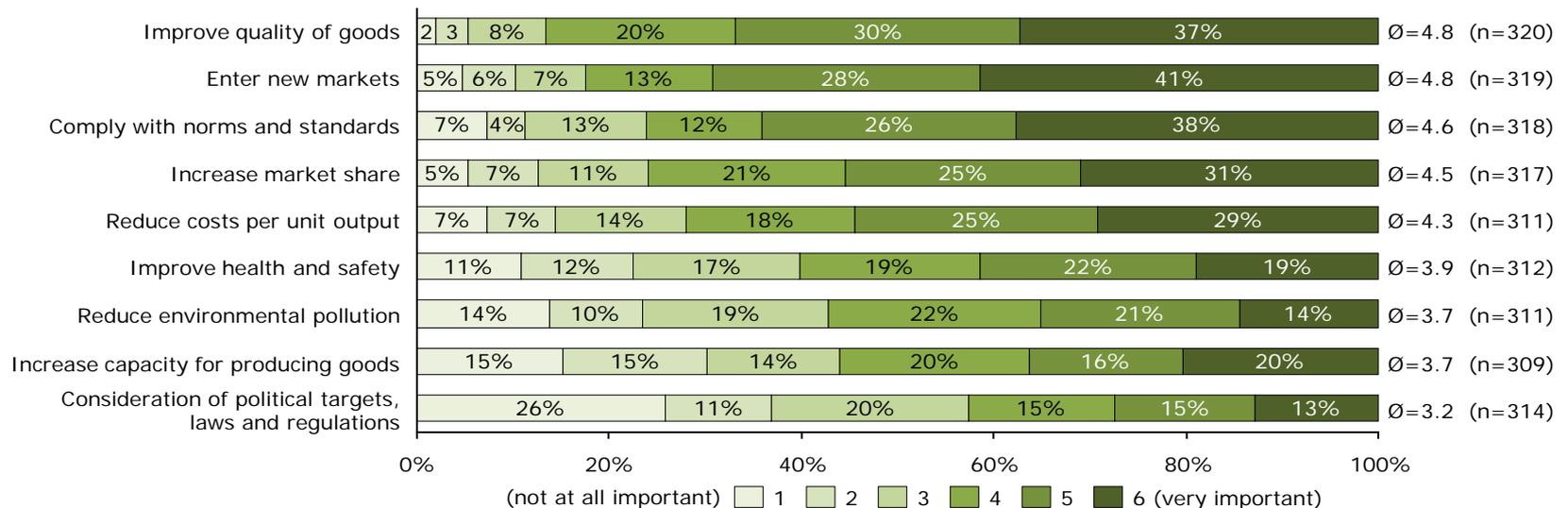


- Confidentiality and lead-time advantages over competitors are used most often to protect intellectual property.
- Protection by patents is used by 40% of companies, while trademarks and copyrights are of no importance.

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Innovation: Objectives

Importance of objectives for activities to develop product or process innovations in the RE branch in the three years (2011-13)

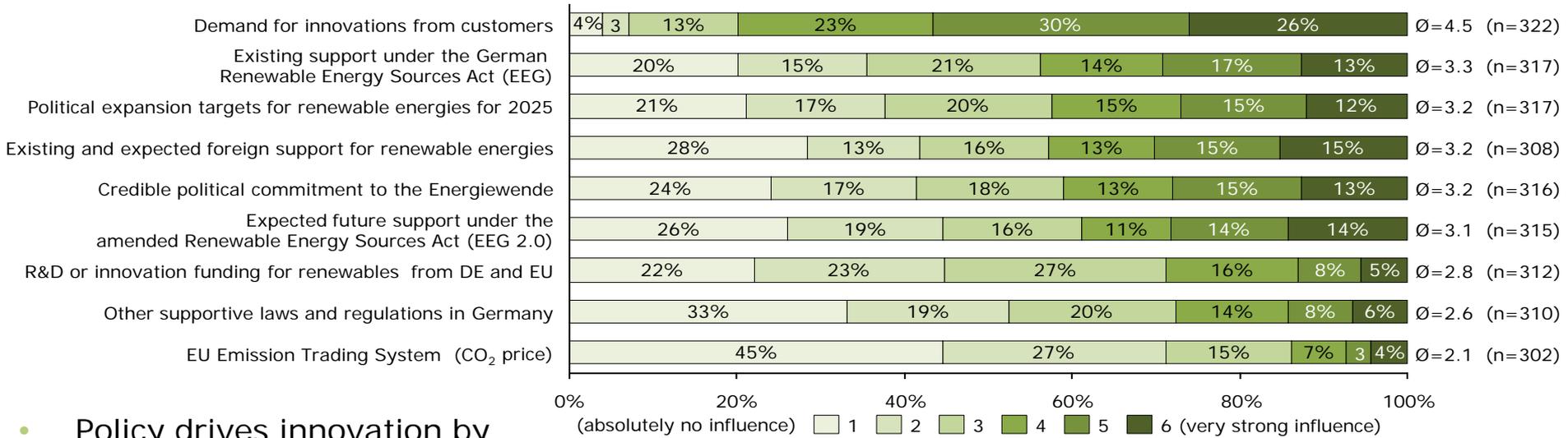


- The most important innovation objectives from 2011 to 2013 were to improve the quality of goods and enter new markets.
- In addition, complying with norms & standards, increasing the market share and reducing costs played an important role.

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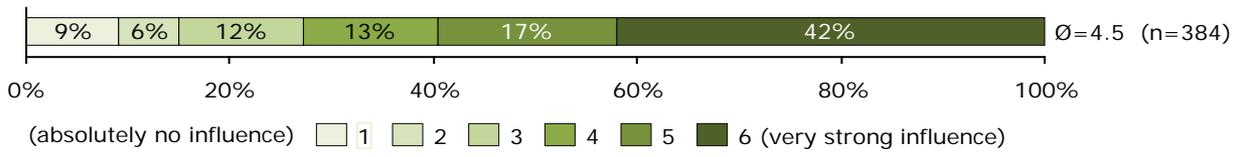
Innovation: Influence of political factors

Influence of demand and political factors on innovation activities in the RE branch (2011-13)



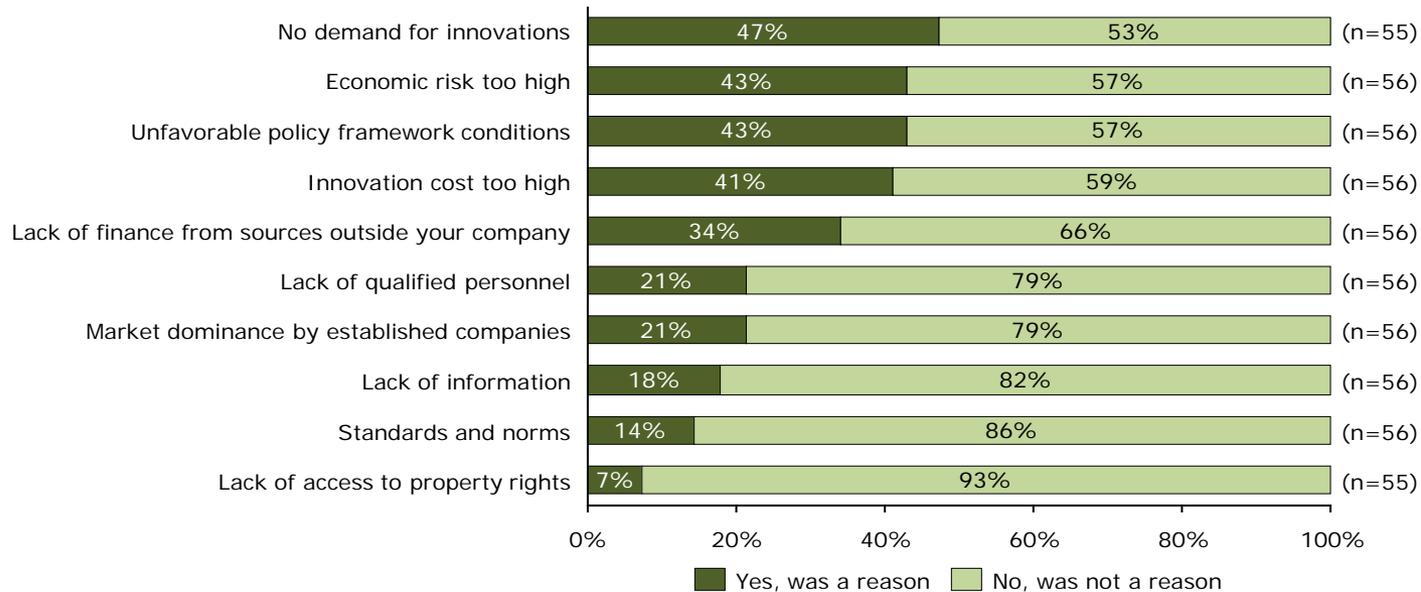
- Policy drives innovation by generating demand.
- EEG and foreign equivalents, targets, and the credibility of the Energiewende considered equally important.

Significance of policy framework conditions (incl. EEG) for the German sales market for renewable energies (2011-13)



No innovation: Reasons

Reasons for performing no innovation activities in the RE branch in the three years (2011-13)

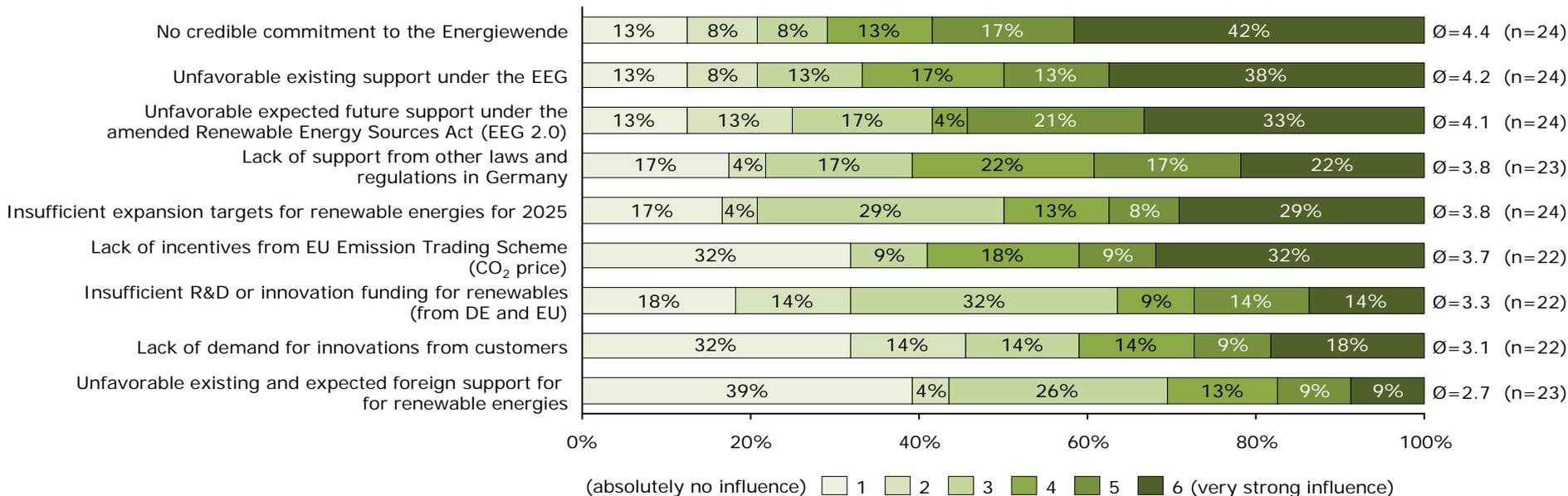


- The main reasons for companies not to engage in innovation activities in 2011-13 were a lack of demand for innovations, unfavorable policy framework conditions, too high economic risks and innovation costs.

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No innovation: Political obstacles

Influence of demand and political factors on the decision not to pursue any innovation activities in the RE branch (2011-13)

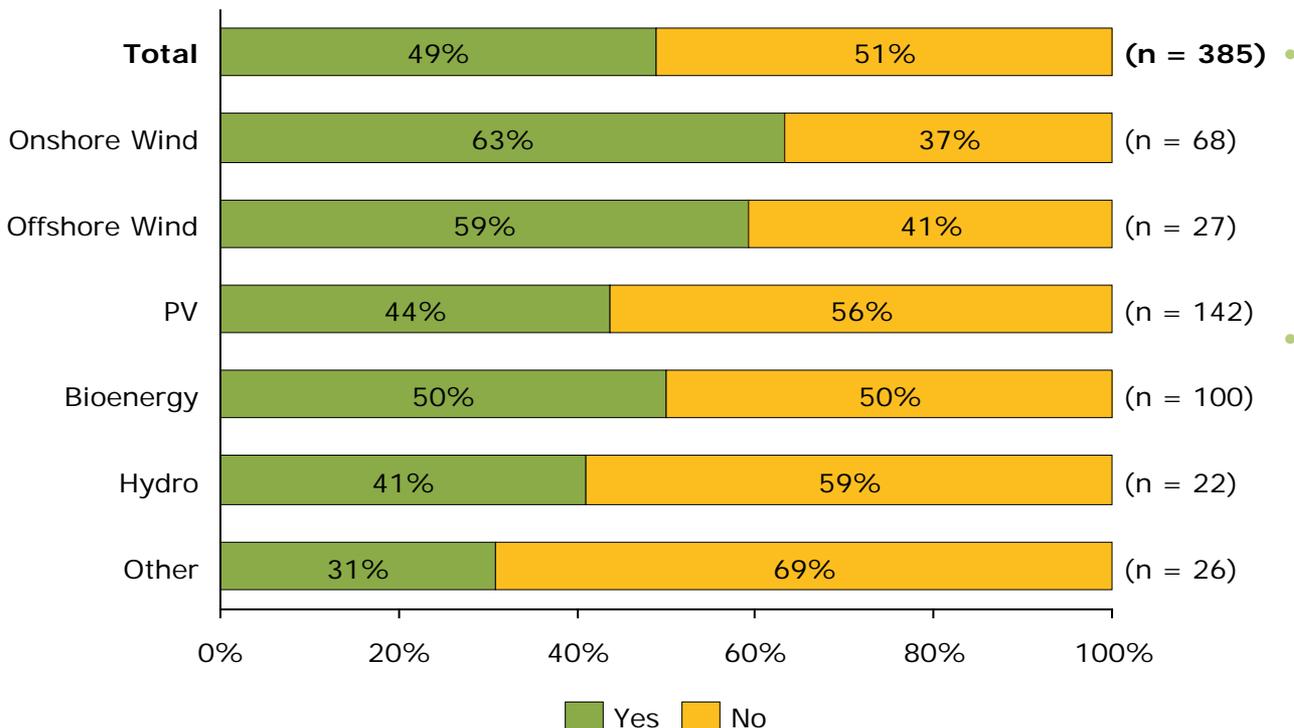


- Non-innovators most missed a credible political commitment to the Energiewende and criticized the insufficient support under the German Renewable Energy Sources Act (EEG).
- In contrast, lack of demand for innovations from customers and unfavorable foreign support are seen as the lowest obstacles to innovation.

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Innovation: Expansion of production facilities

Investments in the expansion of production facilities for the RE branch (2011-13) (differentiated by RE branch)

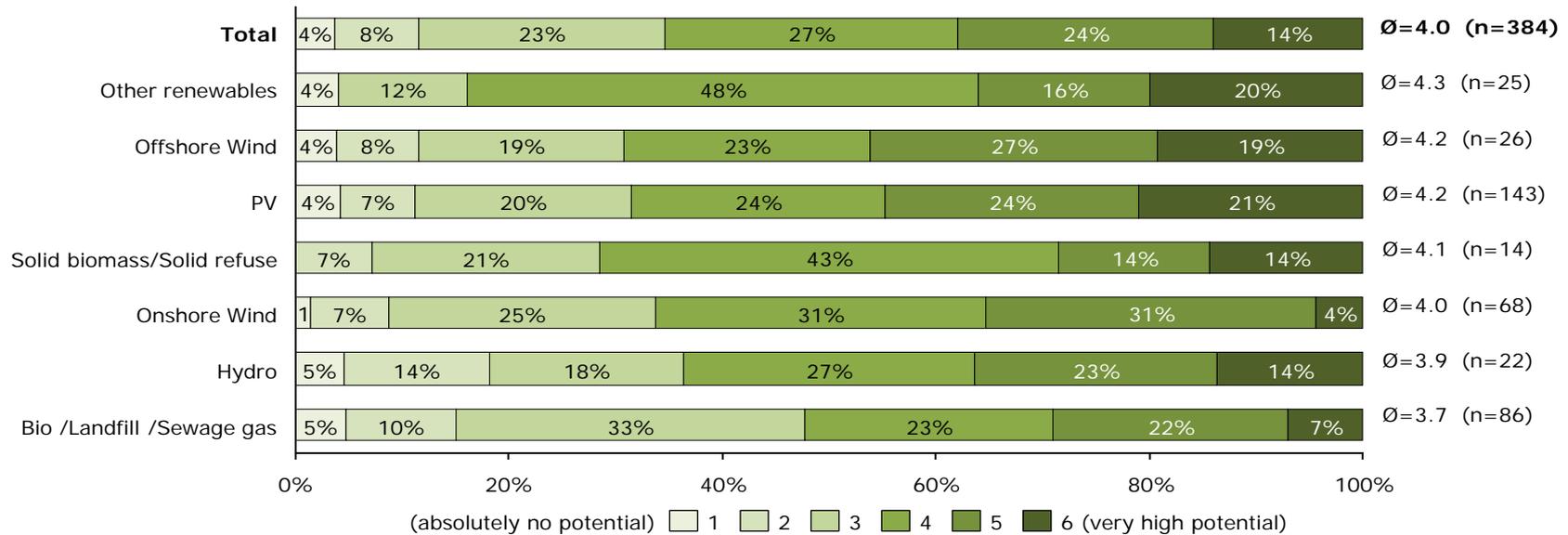


- About half the companies invested in the expansion of their production facilities during the three years (2011-13).
- This percentage was slightly higher (60%) for onshore and offshore wind, but considerably lower for other technologies (approx. 30%).

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Innovation: Innovation potential until 2020

Assessment of the innovation potential of products in the RE branch until 2020

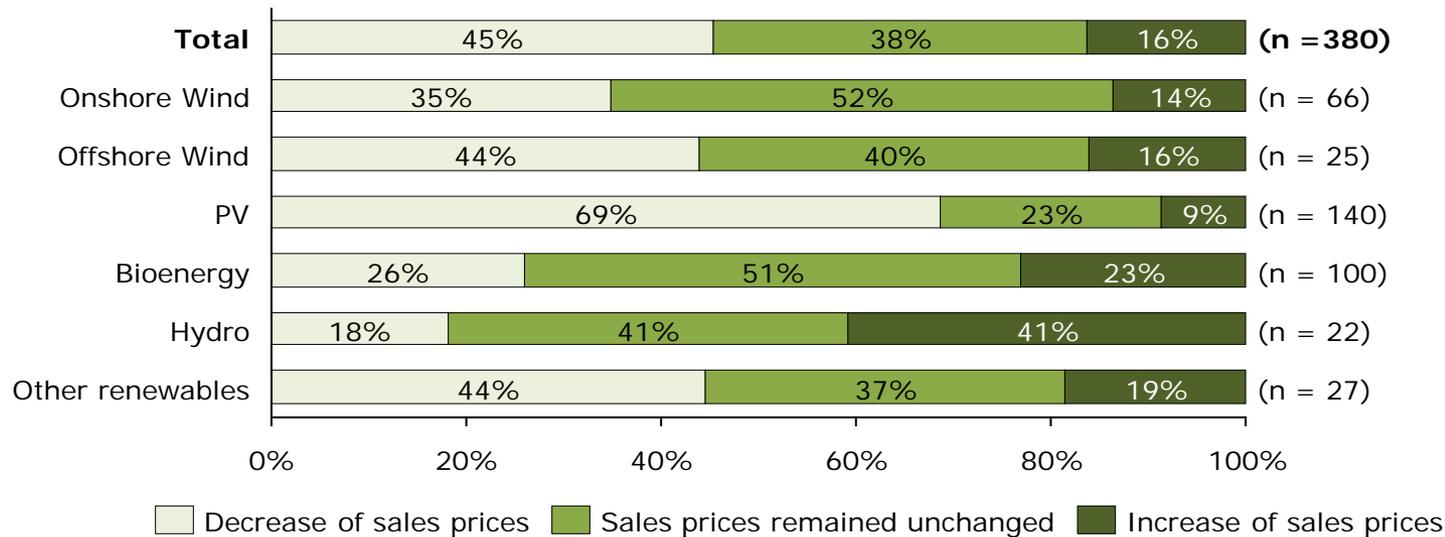


- Companies think products in their RE branch have a relatively high innovation potential until 2020.
- The biggest potential is expected for offshore wind, PV and other renewable electricity generation technologies; the smallest for biogas and hydro.

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Market: Price development – RE products

Change in sales prices in 2013

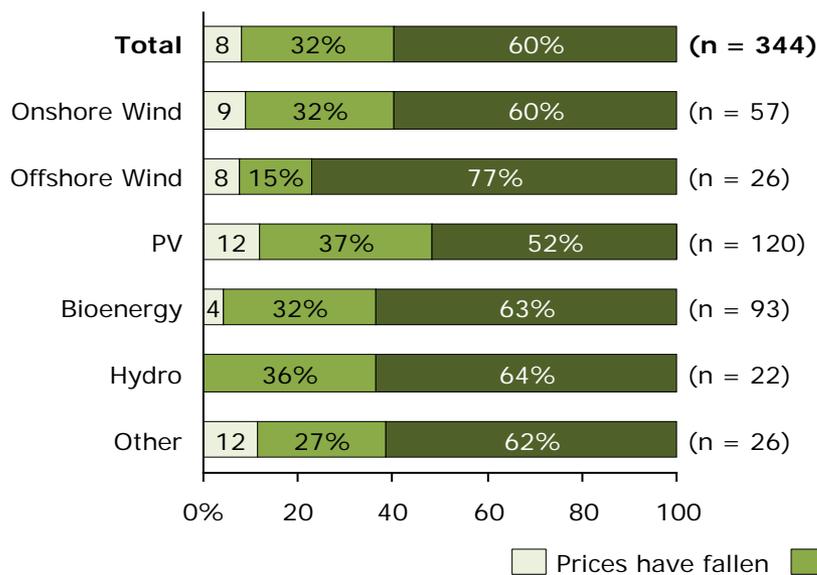


- Sales prices for RE products have fallen for the majority of companies (45%); the highest share reporting such a decrease are companies active in PV (69%).
- In contrast, only 16% of the companies indicated an increase of sales prices.
- On average, sales prices for RE products had decreased about 6% in 2013.

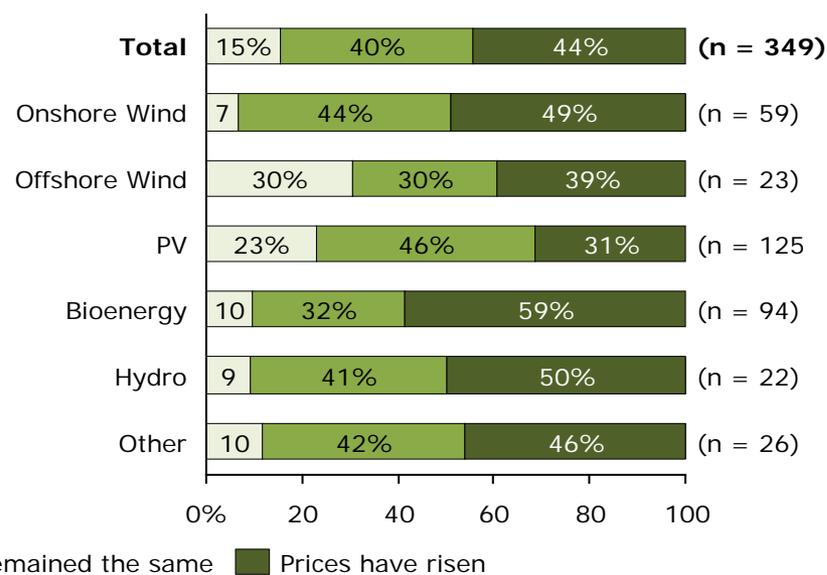
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Market: Price development – inputs

Change in energy prices in 2013



Change in material prices in 2013

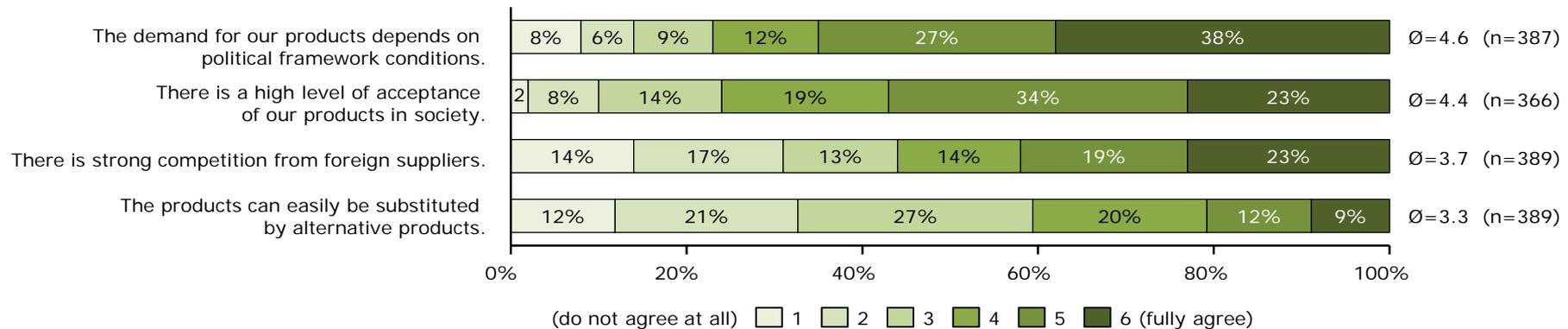


- Particularly the input prices for energy increased for the majority of companies (60%) in 2013 – on average by about 3.1%.
- The input prices for materials also increased for almost half the companies (44%) in 2013 – on average by about 1.7%.

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Market: Competitive environment

Characteristics of the competitive environment of companies



- The most decisive characteristic of the competitive environment in RE branches is the dependence on political framework conditions, followed by a high level of social acceptance.
- About half the companies view the competition by foreign suppliers as strong.
- Competition intensity is probably moderated to some extent as RE products are not easily substituted by competing products.

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Outlook: Innovation impact of the Policy Mix

- Further analyses indicate that the following aspects of the policy mix play a statistically significant role for the level of innovation expenditure by manufacturers of renewable energy power generation technologies:
 - Changes in domestic and foreign demand
 - Public R&D funding of previous years (from DE and EU)
 - Alignment of political instruments with expansion targets
 - Credible political commitment to the *Energiewende*

Source: Rogge, K.S. and Schleich, J. (2015): [Do policy mix characteristics matter for \(eco-\)innovation?](#) A survey-based exploration for manufacturers of renewable power generation technologies in Germany. Presentation at the 5th EU-SPRI Forum, June 2015, Helsinki.

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Contact and further information

- We would like to thank all companies for participating in the GRETCHEN innovation survey!
- Please send any comments, questions and other feedback about the results presented here to:

 info@projekt-gretchen.de

- Further information about the GRETCHEN project sponsored by the BMBF can be found under:

 www.project-gretchen.de

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