



GERMAN STANDARDISATION PANEL (DNP)

Standardisation Research, Policy and Promotion

Indicator Report 2023

» **Standards and the access to affordable and clean energy**

SPONSORED BY DIN AND DKE
UNDER THE PATRONAGE OF THE FEDERAL MINISTRY FOR ECONOMIC AFFAIRS AND
CLIMATE ACTION

Authors Prof. Dr. rer. pol. Knut Blind
Luzie Kromer, M.A.



Published by DIN Deutsches Institut für Normung e. V.

Office DIN e.V.
Burggrafenstraße 6
10787 Berlin
Phone: +49 30 2601-2691
Fax: +49 30 2601-42691

Executive Board Christoph Winterhalter (Chairman)
Daniel Schmidt

Edited by Technische Universität Berlin
Department for Innovation Economics
Office H47
Straße des 17. Juni 135
10623 Berlin

Collaborators Anna Gleu, M.Sc
Maarten Dohrwardt, B.Sc.
Lucas Marcante, B.Sc.
Daniele Rosenberg

Publication Deadline May 2023

Cover Image Giuseppe Famiani on unsplash.de, downloaded on May 11 2023

MESSAGE OF GREETING



from Dr. Franziska Brantner

Parliamentary State Secretary at the Federal Ministry for Economic Affairs and Climate Action

for the 2023 German Standardisation Panel

Russia's war of aggression on Ukraine launched in February 2022 has raised concerns about energy shortages and made it particularly clear to us that the energy transition must now be achieved very quickly. This means that we need to continue to ambitiously expand the use of renewable energy, promote sustainable, energy-efficient manufacturing methods and infrastructure, establish related lead markets and also invest in regional value creation. This can also create new competitive advantages.

In launching a package of immediate energy measures, the Federal Ministry for Economic Affairs and Climate Action has already taken a huge step forward and is paving the way for making our energy supply as climate-neutral as possible by significantly accelerating the expansion of renewable sources of energy. It is also important to reduce energy consumption and increase energy efficiency. In this context, standards play an important role and help to build a safe and efficient nationwide energy supply system. Standards are also indispensable for implementing the energy transition. They support the development and use of renewable and carbon-free technologies, such as photovoltaics.

The results of this year's survey by the German Standardisation Panel show that, when it comes to implementing the energy transition, companies often still underestimate the influence of standards. They further show that the potential of standardisation does not yet appear to have been exhausted in this context. Companies' decisions on sustainable energy use are determined by keeping costs and technical rules to a minimum. However, companies whose experts are involved in energy-related standardisation bodies and which are already certified in accordance with the energy management standard ISO 50001 consider the influence of standardisation to be significantly greater. The global spread of the ISO 50001 energy management certificate is a success story and an important factor for the successful implementation of strategies for improving energy use in small, medium-sized and large companies alike.

However, the results also show that we need greater commitment to standardisation, not least in energy-related topics, and to a strategic and binding use of standards in order to implement the energy transition successfully. For this reason, the Federal Ministry for Economic Affairs and Climate Action has also set up the German Strategy Forum for Standardisation. This body allows us to work together in a coordinated manner with decision-makers from all stakeholders in industry, civil society and government that are involved in private-sector standardisation. Questions such as how we can acquire further expertise in standardisation also play a role here, as these are important to also be able to strengthen Germany's interests in the area of international standardisation, both in terms of the content of standards and the staff involved in standard-setting processes.

It is gratifying that the European Commission has agreed to an initiative to take the German Standardisation Panel to the European level. On the occasion of the World Standards Day in autumn, a pilot survey will be sent to companies across Europe. This international survey on standardisation will also make an important contribution to the implementation of the European Standardisation Strategy and build greater awareness about the importance of standardisation. One thing is clear: only by working together will we be able to accomplish projects like the European energy transition.

For eleven years now, the annual survey of companies on the subject of standardisation has been providing German industry with up-to-date scientific findings from standardisation research. These are all the more important now, as the economy and society need support as they cope with the transformation of the energy sector. I wish all readers of this year's survey report interesting and valuable insights.



AUTHORS



Prof. Dr. Knut Blind

is Professor of Innovation Economics at the Faculty of Economics and Management of the Technical University of Berlin (TU Berlin) and coordinator of Innovation and Regulation at Fraunhofer Institute for Systems and Innovation Research ISI.



Luzie Kromer, M.A.

is a research associate at the Chair of Innovation Economics of the Technical University of Berlin (TU Berlin) and scientific director of the German Standardisation Panel.

CONTENTS

03	Greetings from the Parliamentary State Secretary at the Federal Ministry for Economic Affairs and Climate Action
05	Authors
07	Executive Summary
10	Creating an empirical basis for the exploration of the German standardisation landscape
15	The importance of standards and specifications
23	Standardisation activities
26	Certification of management systems
28	Standards and the access to clean and affordable energy
39	Conclusion
41	Survey Details
42	Glossary

GERMAN STANDARDISATION PANEL 2023

**YEARLY INDICATOR REPORT FOR
THE IMPORTANCE OF
STANDARDS AND
STANDARDISATION ACTIVITIES OF
GERMAN COMPANIES**

EXECUTIVE SUMMARY

Innovations are an important source of growth and prosperity. When an idea turns into a successful market solution, many factors have contributed to this accomplishment. Two of these factors are standards and standardisation. This is underlined by their inclusion in the OECD's Oslo Manual in 2018.¹ The EU Standardisation Strategy, published in February 2022, aims to strengthen the role of standards in promoting EU competitiveness and to harmonise and accelerate standardisation processes. The G7 standardisation strategy, formulated in 2022 under the auspices of Germany, emphasized the importance of international cooperation in standardisation to combat climate change and implement the digital energy transition. In early March 2023, the US standardisation strategy was published. It focuses on international cooperation with partners such as the EU. The focus here is on the integrity of technical performance and fair processes at the international level, in contrast to countries such as China. The US seeks to facilitate cooperation and information sharing in the development of international standards with the EU and other partners through cooperative agreements and other mechanisms.²

A systematic analysis requires a detailed, reliable database. Panel data is necessary to research the complex effects of standardisation processes and the application of standards on business success. This is information from a survey conducted among the same economic actors (individuals or companies) on the same topic over a longer period. This year, data from eleven waves of the German Standardisation Panel (DNP) can be linked to form such a panel. Based on this so far unique data set, insights into changes in standardisation behaviour and the use of standards by companies from 2013 to 2022 will be gained. The pilot study in 2012 cannot be considered for the panel dataset due to an insufficient number of observations.

¹ OECD and Statistical Office of the European Communities (2018): *Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data*, 4th Edition. Retrieved from <https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.html>.

² The White House (2023): *The 2023 United States Government National Standards Strategy*. Retrieved from <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf>.

The present evaluation validates the results from previous years but also offers new insights into the development of companies' standardisation activities. The following central findings can be derived:

- 1 Formal standards and technical rules or specifications of the official standardisation organisations are by far the most important types of standards for all companies surveyed. They promote the establishment of legal security and facilitate market access for companies. Over time, the importance of company standards is declining, while technical rules and specifications at the national and EU level are gaining importance. Compared to previous years, consortia standards have declined in importance at all levels.
- 2 Internal company standards are the third most important type of document and are considered more important than informal Consortia standards or de-facto standards. They are used by most of the companies participating in the survey, but especially by large and innovative companies, and are mainly relevant for quality and productivity improvements. Small companies value external company standards in terms of a good negotiating position vis-à-vis suppliers and buyers.
- 3 Consortia and de-facto standards are primarily relevant for the realization of technical interoperability. Participation in consortia is primarily motivated by the faster speed of standardisation processes, while the type and number of users, as well as the possibility of influencing government regulation, speak in favour of formal standardisation.
- 4 Sustainability and resilience were added to the panel questionnaire as new aspects linked to corporate success. Here, too, formal standards and technical specifications were found to have the greatest influence, followed by internal company standards.
- 5 For certifications according to the already established standards DIN EN ISO 9001 (quality management) and DIN EN ISO 14001 (environmental management), there was an increase among participants this year. This year, the highest number of first-time certifications was recorded with ISO/IEC 27001 (IT security procedures). Another special feature compared to previous years is that more initial certifications are planned for ISO 14001.
- 6 For standard-setting companies, it is above all the costs that have an influence on internal company decisions about the sustainability of energy use. In contrast, standardisation is considered to have little influence. However, companies that are already certified with ISO 50001 consider its influence to be greater. Nevertheless, the companies rate the potential for managing the energy transition of all types of standards higher than the actual contribution that the standards already make.

CREATING AN EMPIRICAL BASIS FOR THE EXPLORATION OF THE GERMAN STANDARDISATION LANDSCAPE

Introduction

In the autumn 2011, the German Standardisation Panel (DNP) was initiated by the German Association for the Promotion of Research on Standardisation (FNS). The FNS had the objective of promoting research on topics and issues relevant to standardisation to be able to make scientifically sound statements on standardisation policy aspects. In the meantime, the German Standardisation Panel is commissioned and accompanied by DIN and DKE. Annual surveys within the framework of the DNP collect data that contribute to an inventory of standardisation activities and make it possible to examine the effects of standards and standardisation on various economic and social dimensions. In 2016, the Federal Ministry of Economics and Climate Protection (BMWK) took over the patronage for the first time.

Inspired by the innovation survey established in the member states of the European Union in the early 1990s (on the initiative of the European Commission)³, the DNP created a comprehensive empirical database with a large amount of company information that can be used to answer central questions in standardisation research.

Objective

The data available through the DNP form a basis for gaining new scientific knowledge regarding the standardisation activities of companies, the implementation of standards, and their effects on corporate success. The results of the survey also provide the opportunity to actively derive strategies for engagement in European and international standardisation and to articulate national interests to the European Commission, among others. Another aim of the DNP is to take up and evaluate current standardisation policy initiatives. In the last waves of the survey, the effects of the Covid-19 pandemic, climate change, or the importance of the United Nations Sustainable Development Goals for standardisation were addressed in this regard. In addition, the DNP can be used to assess the impact on the standard-setting industry of economic and geopolitical events such as the Covid-19 pandemic or the consequences of the Russian war of aggression on Ukraine.

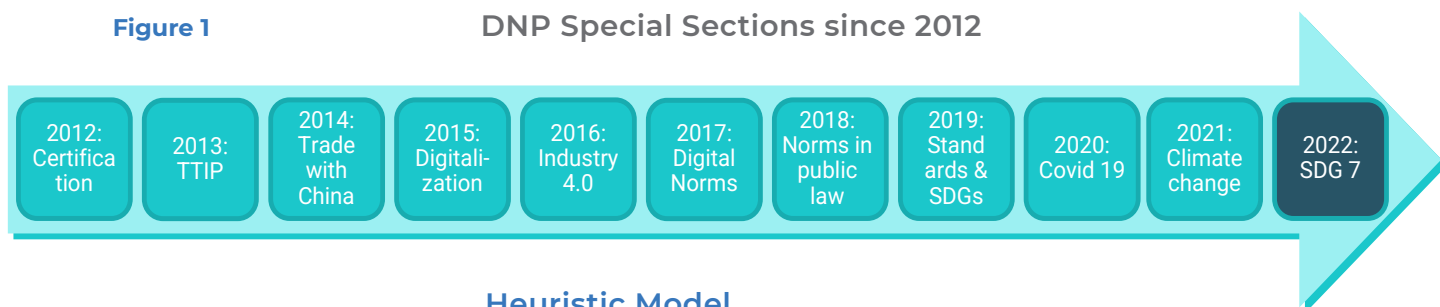
Finally, the DNP is intended to contribute to sensitising companies that have not used standards or have not used them much or are not actively involved in standardisation to the topic and to motivate them to participate. Furthermore, target groups are addressed for whom the topic of standardisation is still foreign. One

³ This is the panel survey of the Community Innovation Survey (CIS), in which companies are repeatedly asked about their innovation activities, problems and successes.

means to this end is the widespread dissemination of the results of the surveys, for example through reports like this one or public events. The DNP is intended to achieve these mutually compatible goals with regard to standardisation research, policy and promotion.

Figure 1

DNP Special Sections since 2012



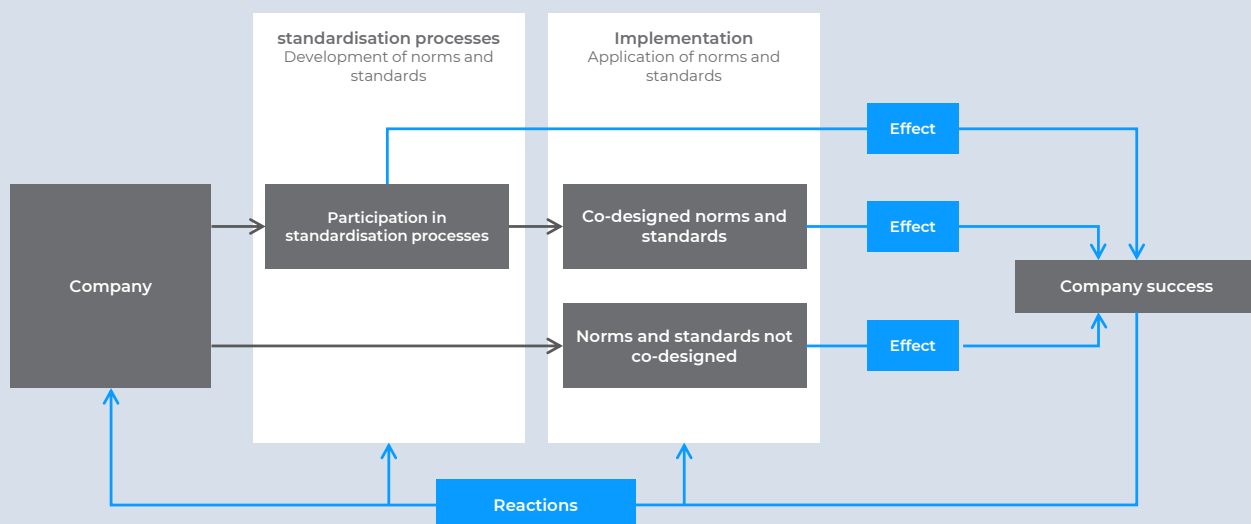
Heuristic Model

The annual survey is divided into core questions and a topic-oriented special section. Conceptually, the core survey of the DNP is based on a heuristic impact model (see Figure 2). This model is designed in a way that the broadest possible range of questions can be integrated. In particular, the model depicts the multidimensional relationships between standardisation participation and standardisation, the implementation of standards, and corporate success.

To characterise the standardisation activities, the type and scope of the standardisation work are recorded, such as the time and personnel effort or the engagement within standardisation bodies. In the area of the implementation of standards, the various cost and benefit dimensions are surveyed. In addition to these aspects, which are aimed more at the development processes and the implementation of standards, the DNP has the long-term goal of recording the effect of standardisation and the application of standards on the success of companies.

Figure 2

Heuristic structural model for the German Standardisation Panel



Realisation

Method On 14 October 2022, World Standards Day, the eleventh wave of the DNP company survey went into the field. The project is carried out by the Department of Innovation Economics at the Technical University of Berlin and is financed and supported by DIN and DKE since 2016 under the patronage of the Federal Ministry of Economics and Climate Protection (BMWK). A total of more than 32,000 experts were contacted in autumn 2022. The number of usable questionnaires is 1,806, which means

Panel data This year, it was possible to analyse data from 272 companies that had already participated in the 2013 and 2014 surveys. On this basis, a balanced panel data set was formed. To obtain a detailed overview of the development of various indicators over the entire survey period, the results of the individual samples of the respective years were also compared. To enable more robust comparability and a sufficient degree of representativeness, the responses of the companies were weighted according to company size and assigned industry. The target distribution was an estimate of the distribution of company size and sector allocation of the companies active in standardisation at DIN, which was created based on a database with almost 10,000 companies.⁴ Based on this unique data set, insights into changes in standardisation behaviour and the use of norms and standards by companies over time can be gained.

Composition of the 2022 sample

In this short report, the sector affiliation, company size, as well as research and innovation activities are used as differentiation criteria to structure the results and to work out individual special features. The composition of the companies participating in the survey in 2022 corresponds roughly to that of previous years, so that the structures of the sample, the experts, and the companies participating in the DNP in 2022 allow comparability with the previous results.

Participants Of the 1,806 questionnaires used in the evaluation, 62% represent companies or groups of companies. 38% of the answers are the views of experts who answered on behalf of a representative company in their sector. For smaller companies with up to 50 employees, most of them were answered by a person from the management board. In larger companies, the participants were mostly located in research and development or quality management departments. Participants most frequently stated that they worked in a specialised standardisation department in companies with more than 1,000 employees.

Provenance & Company size As in previous years, the survey focused primarily on German companies. Companies with their headquarters in Germany made up the largest group of participants with almost 90%. Most foreign companies have their headquarters within Europe (7%), followed by the USA (2%). The size distribution of the participating companies has remained relatively stable since 2013. Each group formed according to company size contains about a quarter of the participants (classification: < 50, 50 - 249, 250 - 999, 1,000+ employees). It was thus also possible to represent the perspective of small and medium-sized enterprises well (SMEs, < 250 employees), which make up 51% of the sample. While the share of smaller companies was highest in the service sector (> 50%), responses from groups of companies with more than 1,000 employees came mainly from the automotive construction or chemical

⁴ Industry classification according to the classification of economic activities, 2008 edition (WZ 2008), Federal Statistical Office

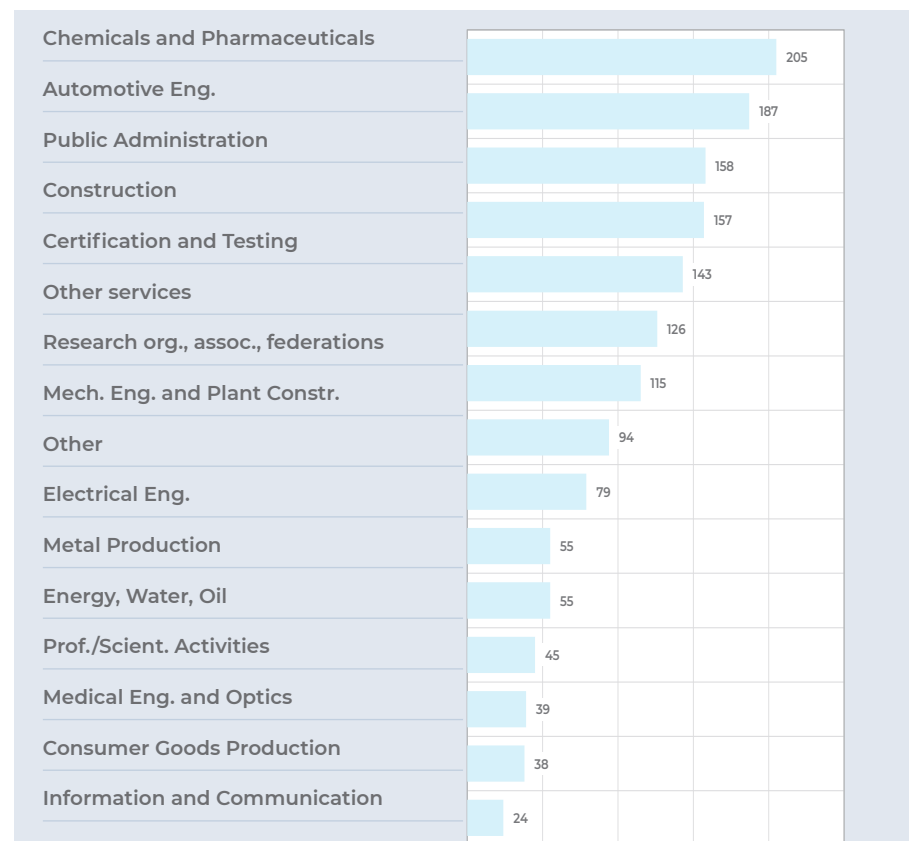
and pharmaceutical sectors.

Industries

The composition by sector has changed only slightly compared to previous years. Thus, with 12%, most of the participating companies are active in the chemical and pharmaceutical industry ($n = 205$), followed by 11% from vehicle construction ($n = 197$), 9% each from public administration ($n = 158$), construction ($n = 157$), certification and testing ($n = 150$), and companies in the service sector ($n = 143$). In contrast, only 1% of the companies were active in the information and communication (ICT) sector ($n = 24$). Compared to the 2021 survey, the proportion of participants from the chemical and pharmaceutical sector, automotive and public administration has increased and the proportion of companies from the mechanical and plant engineering sector has decreased (see Figure 3).

Figure 3

Number of participants by industry



Research & Innovation

Some of the companies' innovation activities have increased slightly compared to the previous year's survey. Thus, 60% of the 674 persons responding to the question stated that they had introduced product innovations and 56% process innovations in the previous year. These values correspond to the previous year's values. A comparison of the weighted samples shows a slight decrease in contrast to the previous year. (Internal) research activities were carried out by a total of 61% of the companies and 50% cooperated with external research institutions. Cooperation with external research institutions thus increased compared to the previous year. The proportion of enterprises that carried out innovations, conducted research, or entered research and innovation cooperations was lower among small (26%) and medium-sized enterprises (25%) than among very large enterprises (32%). Enter-

prises in the automotive sector were the most likely to have introduced product innovations (81%), followed by the machinery and plant manufacturing sector (79%) and the chemical and pharmaceutical sector (78%). The highest proportion of (internally) researching companies was in metal production (86%), the chemical and pharmaceutical industry (82%), and vehicle construction (81%), while the lowest proportion of researching companies was in medical technology and optics (36%). Universities, associations, and federations (78%) cooperated most frequently with external research institutions.

Export Of the 668 companies that provided information on their export activities in 2022, 62% export within the EU, 17% to the USA and the rest of the world, and 2.3% to Asia. Most exports to the USA and the rest of the world are carried out by very large companies. The sectors with the most companies exporting were information and communication (38%) and electrical engineering (33%). The highest average shares of export sales were in consumer goods, machinery and equipment, and electrical engineering. The largest corresponding share of exports to the USA was in machinery and equipment (23%) and metal production (22%). Within the European Union, information and communication has the highest export share with 38% followed by consumer goods manufacturing with a share of 32%.

THE IMPORTANCE OF STANDARDS AND SPECIFICATIONS

The annual survey of the German Standardisation Panel deals in its core part with the importance of standards for companies in different sectors. Five types of standards are distinguished: Formal standards such as DIN standards, technical rules or specifications (e.g., DIN SPEC), informal Consortia standards, de-facto standards, and internal and external company standards. Except for the latter, a distinction is made between their importance at national, European, and international levels. In the case of formal standards, this thus refers, for example, to DIN standards (national), the European standards EN (CEN, CENELEC or ETSI), and e.g., ISO standards (international). The glossary provides further information on the different types of norms and standards.

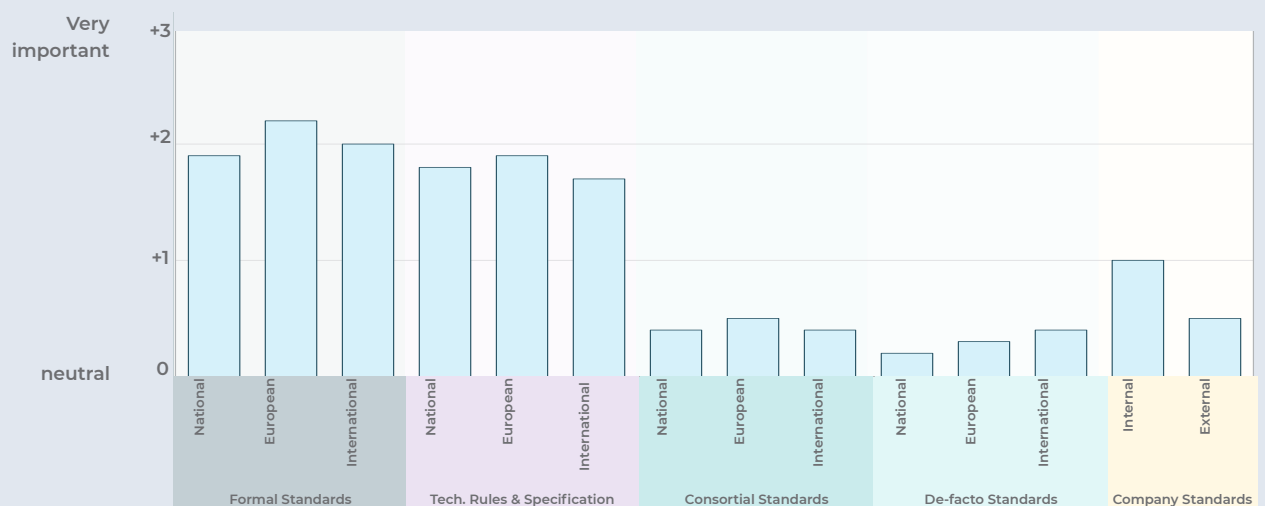
Formal standards continue to have the greatest importance, especially at the European level

As in the previous years, formal standards and technical rules or specifications are the two most important types of standards for experts active in standardisation in 2023 (see Figure 4). While this applies regardless of sector and innovation and research activities, the importance of formal standards at European and international levels increases on average with the size of the company. For small companies, European standards are also of greatest importance, but national standards are still ahead of international standards in this group. The assessment by SMEs and large

Figure 4

Importance of standards

Average rating of the importance of norms and standards at various regional levels. Rating scale from -3 (very unimportant) to +3 (very important). N=1.921-1.990



companies differs most clearly regarding internal and external company standards. In general, the role of consortia standards and company standards is rated significantly lower this year than in previous years. Overall, companies that have more than 250 employees, are involved in international standardisation activities, have introduced product or process innovations, and rate internal company standards on average as more important.

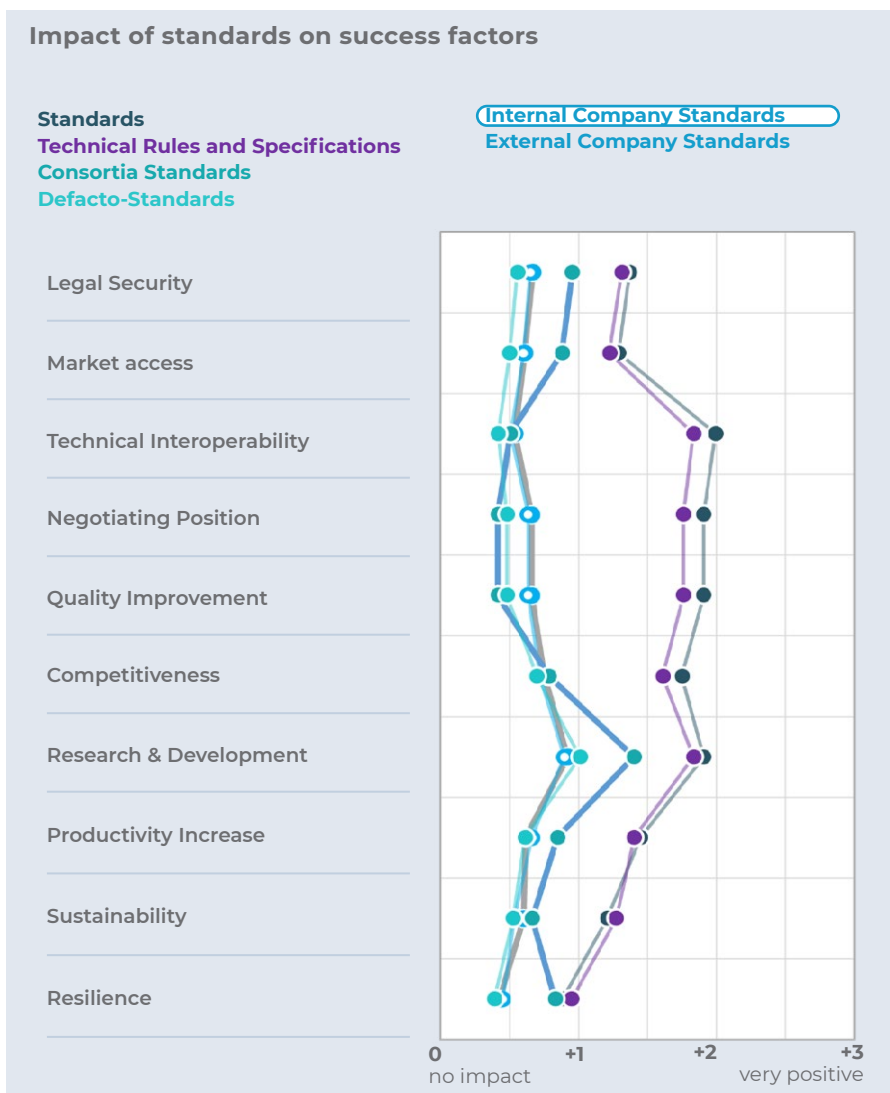
Figure 5

Importance of national and international formal standards and Consortia standards, as well as internal and external company standards by industry. -3 (very unimportant) to +3 (very important). Total N=1.339

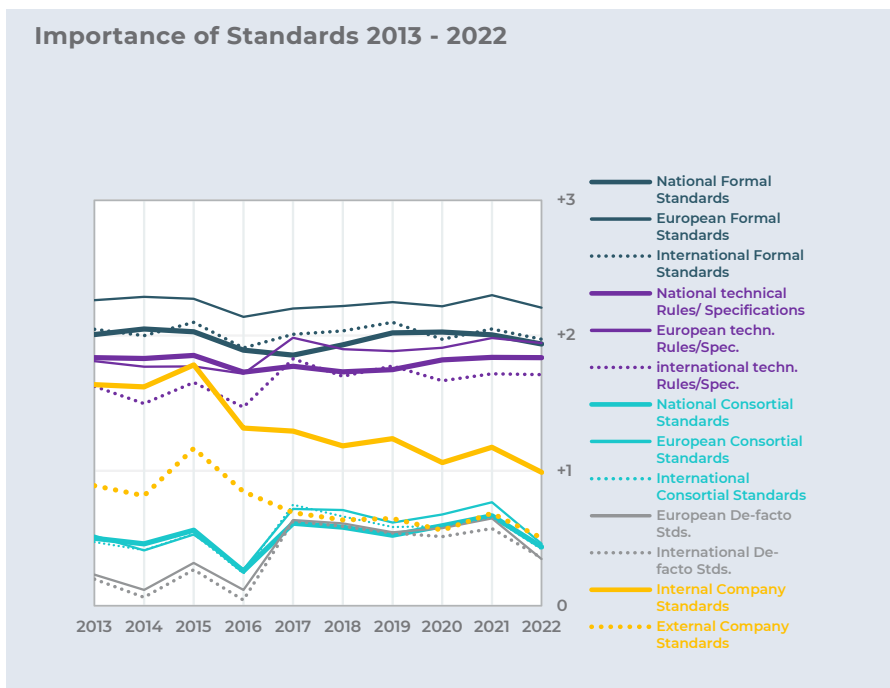


Figure 6

Average assessment of the impact of different types of standards on success factors. -3 (very negativ) - +3 (very positive). N= 8.420 - 11.245

**Figure 7**

Change in the assessment of the importance of various types of standards between 2013 and 2022. Scale -3 (very unimportant) to +3 (very important). Weighted sample 2013 - 2022, N=19,879



De-facto standards and informal consortia standards are rated as less important in comparison. This is particularly striking this year. They mainly play a role in realising technical interoperability and in increasing quality for large innovative companies. This is especially true for companies that are part of a multinational group and are involved in international standardisation. The construction industry, however, rates these types of standards as unimportant at the international level. The automotive and medical technology & optics sectors see these types of standards as important at the EU and international levels. At the national level, they play a major role in public administration.

On average, participants attach the greatest importance to all types of European standards. This is especially true for formal standards and de-facto standards. Metal production and mechanical and plant engineering rate the importance of these types of standards as particularly high, while the service sector attaches the least importance to them.

In contrast to other sectors, national standards play a greater role than international standards for the construction and services sectors. For consumer goods manufacturers and the information and communication sector, standards at the European or international level are more important. The public administration, energy, and metal sectors rate national standards as significant. The most internationally oriented sectors are optics and medical technology, vehicle construction, and metal production. Companies in these sectors attach the highest importance to international formal standards.

Companies from the information and communication sector as well as vehicle construction perceive international consortia standards as important. While in previous surveys such standards were rated as unimportant (negative mean) exclusively by the construction industry, this year professional and scientific services also voted negatively. Overall, the assessment of the importance of consortia standards has decreased sharply this year; electrical engineering, for example, rated the importance of international consortia standards with an average of 0 (no influence), which contradicts the more positive assessment in previous years.

Compared to the previous year, the average assessments based on the weighted samples and the balanced panel sample decreased and reached pre-pandemic levels. Particularly striking is the poor assessment of consortia standards, de-facto standards, and company standards compared to an increasing trend in previous years. So far, the declining scores have only been significant for internal company standards, not yet for the other types. In contrast to the previous year (2021), there is a slight decrease in approval values for national and European formal standards and European specifications. For national and international technical rules and specifications, a very slight growth in importance can be observed.

Influence on success factors through formal standards and technical rules or specifications increasing again

Overall, the assessment of the previous surveys that formal standards have a significantly stronger influence on (company) success factors than consortia or de-facto standards is confirmed. Restoration of the importance of pre-Covid-19 levels for all

Figure 8**Change in assessments of the impact of standards on success factors 2013 - 2022**

Average assessment of the impact of different types of standards on success factors. -3 (very negative) to +3 (very positive). Weighted Samples 2013 - 2022, N=8481 - 11384



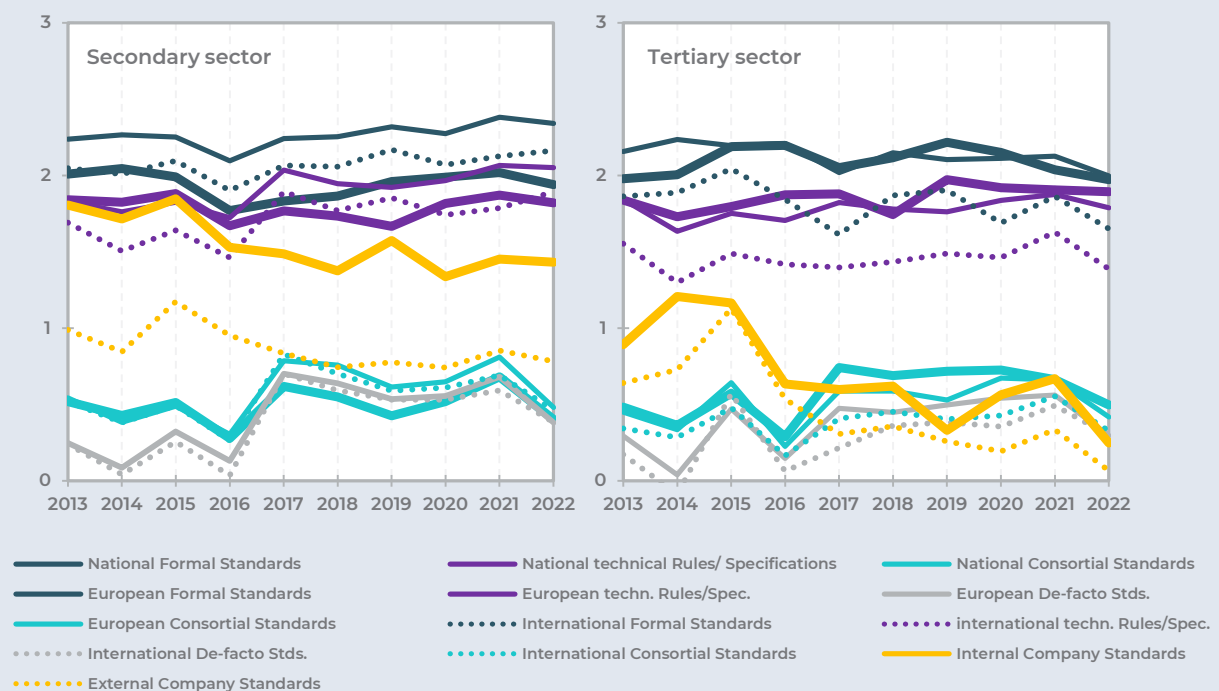
types of standards is also clearly visible (see Figure 8), especially the strong increase in the importance of technical rules or specifications. The influence of de-facto standards, Consortia standards, and external company standards is considered to be less strong in contrast to the other types of standards, even though it is clear that the Covid-19 shock has been overcome.

Particularly about aspects concerning transaction costs through use and access to the market, the companies see, again, more advantages (see Figure 8). For example, formal standards and technical rules and specifications are seen as having a significantly greater influence in terms of guaranteeing legal security, fulfilling formal and informal market access conditions, establishing technical interoperability, and the negotiating position vis-à-vis suppliers and customers than other types of standards, which have stagnated in importance this year or only recorded a slight increase in importance.

Figure 9

Change in assessments of the importance of different types of standards between 2013 - 2022

-3 (very negative) to +3 (very positive). Weighted samples 2013 - 2022, N=4512 - 5824 (secondary sector), N=2150 - 2721 (tertiary sector)



If one considers factors that concern the improvement of internal company processes, above all quality and productivity increases, company standards play a similarly important role as formal standards and technical specifications. In particular, the role of internal company standards must be emphasised here. For years, they have received a higher approval rating than formal standards in the area of productivity improvement. This approval had been declining since the Covid-19 pandemic, but this year shows an upward trend. However, for the first time since the survey, the

value of the importance of internal company standards is lower than the importance of formal standards and technical rules or specifications.

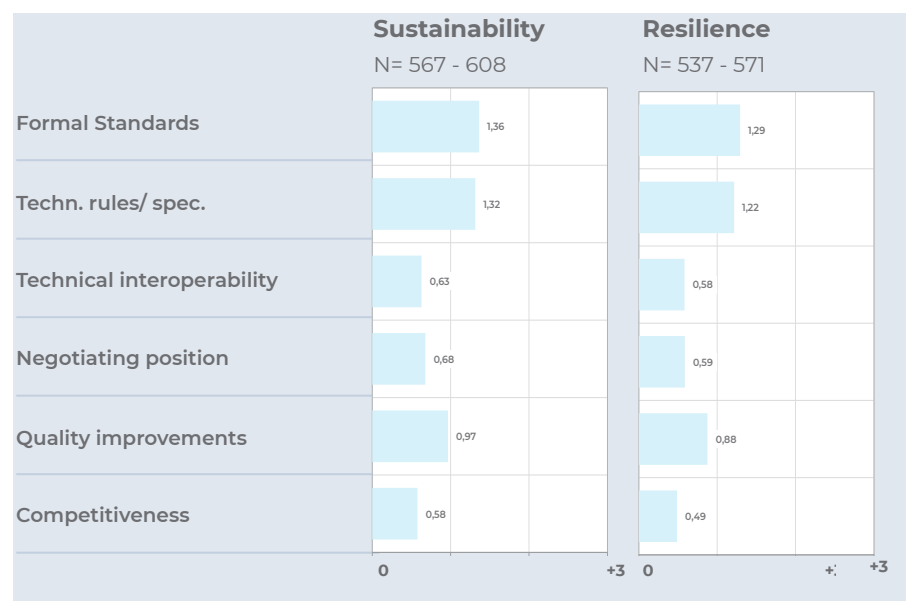
A similar development can be observed in the quality improvement factor, which already occurred before the Covid-19 pandemic. Since 2016, the role of internal company standards has been considered less relevant than formal standards and technical specifications. At the same time, the de-facto standards and consortia standards show stronger agreement with these two success indicators than with the other aspects linked to corporate success. A similar picture emerges with regard to the optimisation of research, development and innovation activities as well as competitiveness. Here, internal company standards are attributed greater importance compared to consortia and de-facto standards. In particular, a stronger increase can be seen in competitiveness this year. The approval ratings of the importance of formal standards and technical rules are notable in the area of development and innovation activities, as technical rules or specifications are rated as more important than formal standards this year.

This dichotomy of assessments is consistent with the results of an earlier survey on the macroeconomic benefits of standardisation.⁵ This also came to the assessment that internal company standards are important for the success of internal company processes and that formal standards are above all important for successful operation on the market. The latest surveys indicate that formal standards and technical rules or specifications are increasingly taking over both functions (Figure 8).

Figure 10

Assessments of the impact of standards on sustainability and resilience

Average assessment of the impact of different types of standards. -3 (very negative) to +3 (very positive). Unweighted, mean values



"Sustainability" and "Resilience" as new success factors

In view of current developments in society and the volatile geopolitical situation as well as threats to the environment, two new success factors were included in the panel survey: The aspects of sustainability in the company, the products and processes as well as resilience, which have gained increasing importance in the industry in recent years.⁶

⁵ DIN Deutsches Institut für Normung e. V. (2000): "Gesamtwirtschaftlicher Nutzen der Normung: Zusammenfassung der Ergebnisse. Wissenschaftlicher Endbericht mit praktischen Beispielen", Berlin, Wien, Zürich: Beuth Verlag.

Resilience is understood as the ability of a company to withstand external shocks or upheavals in the social, economic, or political environment and to adapt to new conditions.⁷ As with the previous success factors, it was found that formal standards and technical specifications are classified as standards with the greatest influence, followed by internal company standards. Especially in sustainability, certifications such as ISO 14001 and ISO 50001 play an important role. De-facto standards, consortia standards, and external company standards are rated as less important for the implementation of sustainability and resilience in a company.

Figure 11

Assessments of the importance of different types of standards on various aspects related to business success.

■ Formal standards
 ■ Technical rules / specifications
 ■ Consortia standards
 ■ De-facto standards
 ■ Internal company standards
 ■ External company standards



In comparison with the previous, purely economic success factors, the values for the influence of different types of standards on the two success factors of sustainability and resilience roughly correspond to those of competitiveness.

⁶ Brinkmann et al. (2017): *Ökonomische Resilienz Schlüsselbegriff für ein neues wirtschaftspolitisches Leitbild?* In: *Inklusives Wachstum für Deutschland (11)*. Bertelsmann Stiftung. Gütersloh. Abgerufen unter: https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/GrauePublikationen/NW_Oekonomische_Resilienz.pdf.

⁷ Fraunhofer. *Das Magazin 2020 (2)*. Abgerufen unter: https://www.archiv.fraunhofer.de/weiter_vorn_2_2020/#14

STANDARDISATION ACTIVITIES

Participation in standardisation bodies stable

This section of the survey addresses the standardisation intentions of the participants, which could also be influenced by internal company amendments (e.g., changed standardisation budgets). Furthermore, this section of the core part of the DNP survey deals with the external and internal standardisation activities of the companies. In total, between 628 and 715 company and industry representatives provided information regarding participation in standardisation organisations in 2022 and 2021 at different regional levels (DIN and DKE at the national level, CEN, CENELEC, and ETSI at the European level and ISO, IEC, and ITU at international level). Overall, standardisation activity remained stable in direct comparison to the previous year.

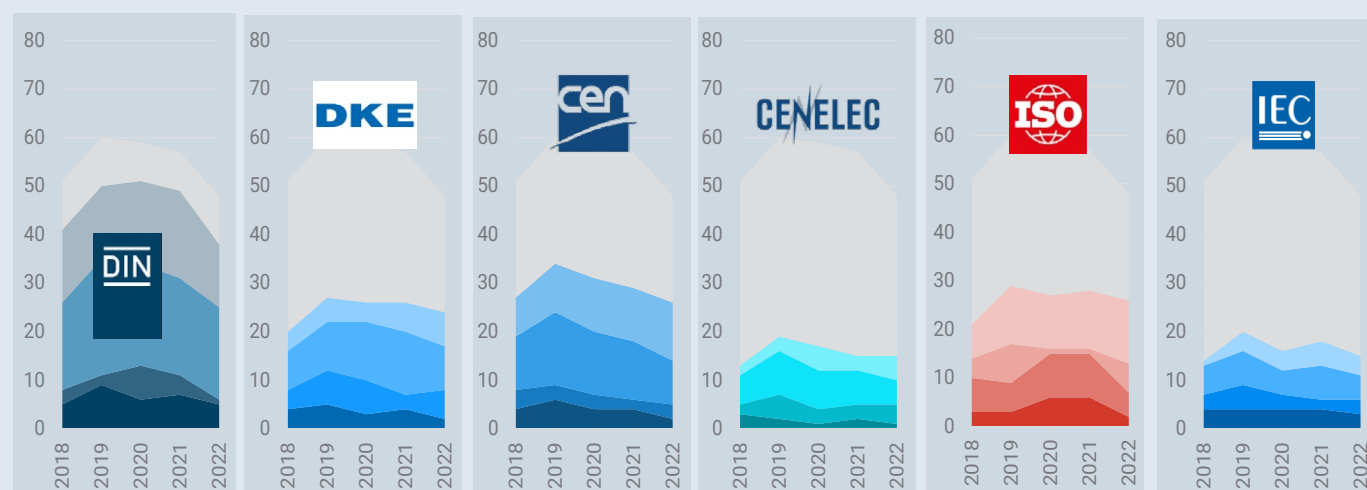
91% of the respondents participated in a standardisation body at the national level (value for 2021 = 88%), with 87% at DIN (value for 2021 = 86%) and 35% at DKE (value for 2021 = 36%) in 2022. At the European level, 57% of the participating companies stated that they had been active in a standardisation body in 2022 (58% in 2021). 54% of the participants stated that they had been involved in an international body (58% in 2021). Thus, 68% of the respondents were active in one of the supranational bodies (value for 2021 = 71%). About 55% of companies were active in consortia; this figure did not change between 2022 and 2021 and is now back to the pre-pandemic figure of 56% in 2019. The 2021 Indicator Report stated 52% participation in consortia. About 55% of companies were active in consortia; this figure did not change between 2022 and 2021 and is now back to the pre-pandemic figure of 56% in 2019.

While most companies surveyed participate in the standardisation processes of national organisations, participation in standardisation at the European and international levels is lower. To some extent, this can be attributed to the system of repre-

Figure 12

Balanced panel: committee seats in standardisation organisations

Board seats in standardisation organisations 2018-2022 (number of companies with respective number of seats), balanced panel (companies that provided information on this from 2018 to 2022, n=74)



sensation of the interests of national bodies in European and international mirror bodies by individual delegates. Two-thirds of the respondents act in bodies at both national and supranational levels, an increase from the previous year. Especially very large companies from the automotive sector (89%) and small and medium-sized companies from the chemical and pharmaceutical industry (74%). While 97% of very large companies with 1,000 or more employees and 94% of large companies (250 - 999 employees) were represented in at least one committee of a standardisation organisation in 2022, this proportion was 89% for very small (<10 employees) and medium-sized companies (10 - 249 employees).

Standardisation department

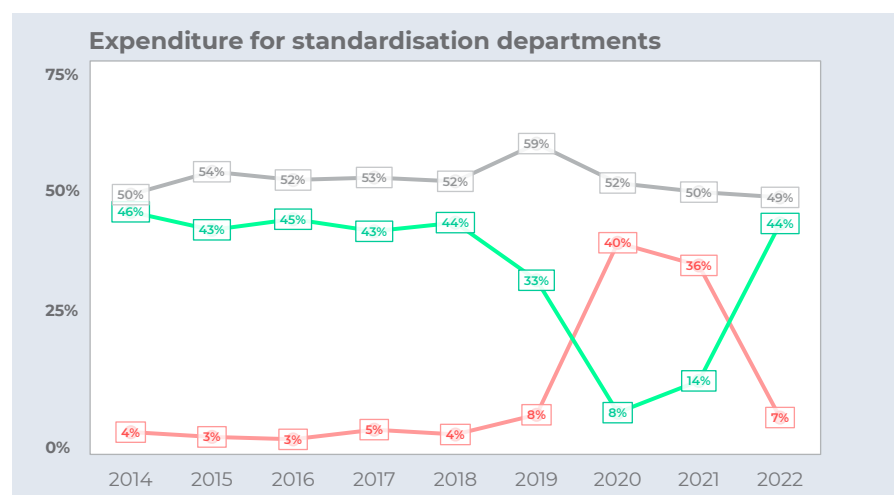
Of the companies surveyed, 12% stated that they had a standardisation department in 2021 and 2022. Most companies from the automotive sector and very large companies answered this question in the affirmative. Among very large companies, the number of companies that said they had a standardisation department decreased by 2% between 2021 and 2022.

Figure 13

Change in expenditure on standardization departments.

N in 2022 = 358 (weighted)

Less
More
Same



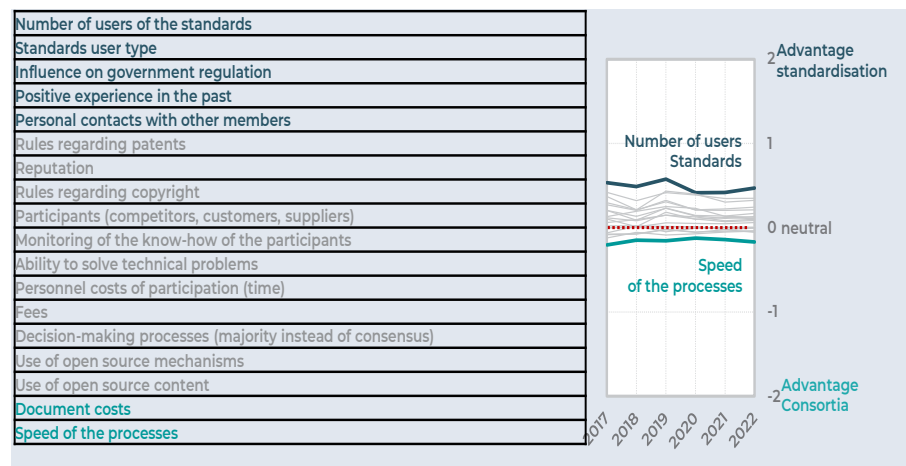
Furthermore, the participants provided information on whether the expenditure for the standardisation departments decreased, remained the same, or increased. The total expenditure for the standardisation department did not change for most companies between 2020 and 2022 (52%). Of the small companies, 43% reported that they had not changed the total expenditure for the standardisation department, and 40% had increased the expenditure for the standardisation department. For only 5% of the companies respectively, the expenditure for the standardisation department had decreased.

Dissemination and ability to influence government regulation key benefits of standardisation

This year's assessments by the experts confirm the results of the previous surveys concerning the criteria that speak for participation in formal standardisation as opposed to consortia. In line with the stronger participation in formal standardisation in the sample, the positive assessment of the corresponding participation criteria also predominates.

Figure 14

Assessment of the extent to which various criteria influence participation in consortia and standardisation bodies. Change in assessments from 2017 to 2022. Scale= -2 (more likely consortia) to +2 (more likely standardisation). N = 4.879 - 5.143



The strongest arguments for standardisation for companies are still the high dissemination and the great influence of formal standards (Figure 14). The highest-rated criterion for participation in standardisation is the high number of users of formal standards. This criterion gained slightly in approval this year. In second and third place are the type of user of these standards and the influence on state regulation that is made possible. Also, clearly in favour of activity in standardisation organisations were contact with other participants, as well as positive experiences in the past and regulations on patents (such as licensing conditions for standard-essential patents). The reputation of committees and monitoring also tend to speak in favour of standardisation.

Two criteria have so far been seen in surveys as advantages for standardisation in consortia: Faster processes and the lower cost of documents. In the assessment of the speed of processes, consortia again received clear approval this year, although this was lower than in previous years. The cost advantage of consortia continues to be rated as a major benefit by a large proportion of respondents, but standardisation caught up in this regard. Although the cost aspect is still rated more positively by companies for consortia, in the criterion of personnel costs, standardisation bodies receive a slightly more positive rating. As already suspected in previous years, the increased digitalisation of standardisation processes established due to the Covid-19 pandemic may have brought about a narrowing of the difference between work in consortia and standardisation bodies.

Overall, the assessments of the aspects that particularly speak for the two types of standardisation, costs and speed of processes for consortia, and the number and types of users as well as influence on government regulation, became more and more aligned since 2016.

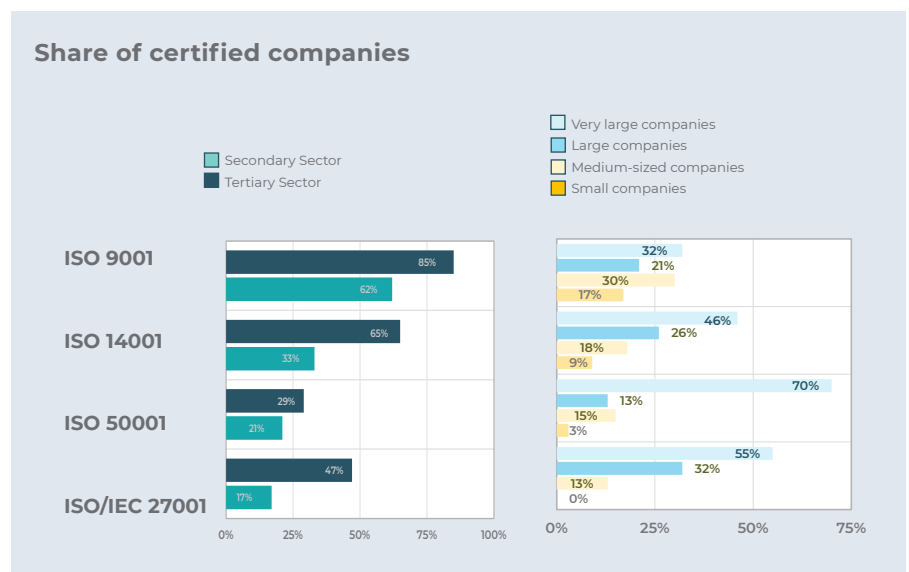
CERTIFICATION OF MANAGEMENT SYSTEMS

More ISO 14001 certifications planned

Another aspect on which participants provided information in the survey was whether they were certified according to certain formal standards in the previous year of the survey (2021). If this was the case, they were also asked to indicate in which year the initial certification took place.

Figure 15

Proportion in 2022 of companies certified according to various standards
N = 256 - 610



As in previous surveys, a large proportion of companies (52%) reported having been certified to at least one of the significant quality, environmental, energy, or IT security management system standards in 2021 (see Figure 15). The results of the individual certifications show that their importance has increased compared to the previous year. With 77% of companies certified, the most widespread certification in 2022 was the ISO 9001 quality management system standard, which represents a 10% increase compared to the previous year's result. In addition, 53% of the companies stated that they had an environmental management system certified according to ISO 14001; here, the most planned new certifications could be recorded with 18%.

The certification that has grown the most in recent years was that of energy management systems according to ISO 50001. 36% of the respondents had this certification in 2021, and 6% of the companies that had implemented these standards stated that they had carried out the certification in 2021. ISO/IEC 27001 related to IT security procedures was implemented in 26% of the participating companies this year, a doubling from the survey after certifications in 2020. Among the participating companies, the highest number of first-time certifications for ISO/IEC 27001 was recorded in 2021, at 21%. Half of the companies (47%) were not yet certified to ISO/IEC 27001, but 12% of these companies are planning to do so.

Certification according to ISO/IEC 27001 still relevant for large companies and vehicle construction

As expected, very large companies (1,000 employees or more) had a significantly higher proportion of certifications. The biggest difference was in IT security management: less than 15% of small and medium-sized companies were certified to ISO/IEC 27001, but 70% of very large companies were. ISO 50001 certifications were very rare among small companies, while 13% of medium-sized companies reported being certified with the energy management standard. ISO 14001 is now used in 15% of small companies, 13% of medium-sized companies, a third (32%) of very large companies, and more than half (54%) of very large companies. Certification of quality management systems according to ISO 9001 was somewhat more prevalent among small companies, with a share of 16% here, and around 30% among medium-sized companies. Innovative companies were also more frequently certified - especially according to ISO/IEC 27001. Companies certified according to ISO 50001 were also particularly active in internal research and development work as well as in product innovations.

Companies from the automotive, chemical and pharmaceutical industries, certification and testing, and construction sectors certified themselves, whereas this was significantly less the case for companies from the information and communication sector and the manufacturing of consumer goods. 74% of the companies from the automotive sector (n = 62) were certified with ISO 50001, significantly more than companies from any other sector. The same applies to certification with ISO/IEC 27001 for information security; here the proportion of certified companies in automotive sector was 67% (n = 57).

Around 544 companies stated that they are certified according to other standards. In particular, the chemical and pharmaceutical industry (81%), the certification and testing sector (79%), and automotive (79%). Regarding certification according to other types of management system standards, just under 341 companies provided more detailed information. As in the previous year, testing and calibration laboratories and certification bodies certified according to ISO/IEC 17025, ISO/IEC 17065, or ISO/IEC 17020 accounted for the largest share (n=160). On the other hand, sector-specific quality management systems, especially in medical devices (ISO 13485, n=51) and in the automotive industry (ISO/TS 16949, n=29), as well as certifications of occupational health and safety management systems according to ISO 45001 (formerly OHSAS 18001, n=47) played a central role.

STANDARDISATION AND ACCESS TO AFFORDABLE AND CLEAN ENERGY

Standardisation and energy security

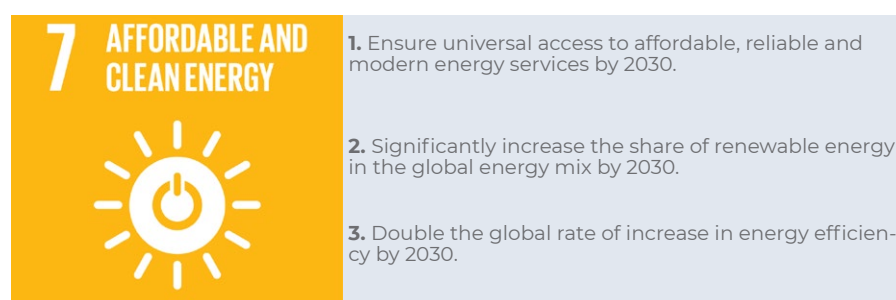
Standards ensure that everything the end consumer is confronted with in everyday life, from the remote control to the dishwasher, functions safely. The same applies to almost all electrical processes in an industrial context. In this year's special section of the German Standardisation Panel, we, therefore, addressed the question of the relationship between standardisation and access to energy, the expansion of renewable energies and the increase in energy efficiency, and standards and standardisation. Are standards already fulfilling their full potential? How important are standards to ensure safe and reliable access to energy supply and which aspects of the standardisation process can still be improved to address the energy transition even more effectively?

SDG 7

The aspirations for affordable energy security and the expansion of renewable energies are addressed in the seventh sustainability goal of the United Nations (UN). The UN's 17 Sustainable Development Goals (SDGs) are political objectives that are intended to contribute to global sustainable development on an economic, social, and ecological level by 2030. The decision for the topic for the special part of the survey of the German Standardisation Panel 2022 was made based on the developments of the first half of 2022. The aim was to shed more light on the energy supply situation in German industry and to understand to what extent standardisation contributes and could contribute to the achievement of the seventh SDG of the United Nations.

Figure 16

SDG 7 and its three subgoals



Energy crisis

The current situation in the summer of 2022 of electricity and gas shortages and the resulting increased prices for these goods, which are a consequence of the events since the beginning of the Ukrainian war.

Energy transition

All measures to expand the use and purchase of energy such as electricity and heat from sustainably usable, renewable or regenerative sources independently of the Ukraine war and in accordance with the Renewable Energy Sources Act (EEG) of the German government.

In 2018, the International Organisation for Standardisation (ISO) began to systematically assign its standards to the individual SDGs to show where standards can contribute to achieving the SDGs. 1,025 standards could be assigned to SDG 7.

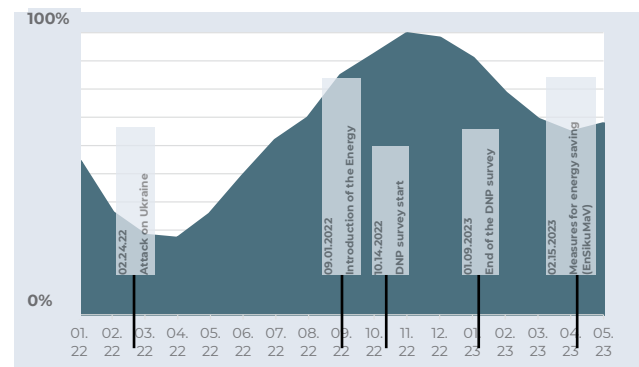
Feared energy crisis in 2022

In 2022, the economy and society in the global north were affected by a challenge they had not faced for years, that of energy security. While this issue remains unresolved in the Global South and many households are still without electricity, the question in the western industrialised countries has so far been more about how to use exclusively renewable energies. Russia's war of aggression on Ukraine in February 2022 changed this view and the question of security of supply with affordable energy moved into focus. The year 2022 was therefore characterised less by the ex-

pansion of renewable energies and the ambitious implementation of the Renewable Energy Sources Act (EEG) of the German Federal Government than by the search for fossil and directly usable energy sources. This uncertainty led to increased prices for the economy and end consumers. It was feared that unrestricted access to energy would no longer be guaranteed.

Figure 17

Fill level of gas storage facilities in Germany on a daily basis from 01 January 2022 to 13 May 2023 in%.
(Source: statista.com, May 22, 2023)



Structure of the survey

The special section of the DNP aimed to take a closer look at the role of standardisation in achieving the seventh United Nations Sustainable Development Goal, access to affordable and clean energy. The companies were therefore asked questions about the relevance of the topic of energy security and how they would be affected by the energy crisis expected in early summer 2022. Furthermore, it was to be determined whether and how the companies surveyed already use renewable energies. By repeatedly asking the participating companies about the relevance of the various SDGs, it was possible to find out which topics would be of concern to the standard-setting industry in autumn 2022.⁸

We then asked to what extent various internal and external aspects, including standardisation, can contribute to the achievement of the three sub-goals of SDG 7. The other aspects were increased internal and external costs, policies, and customer demand. This question was intended to show how the influence of standardisation is assessed in comparison to other economic influencing factors, to the use of more renewable energy, more energy efficiency, and in the procurement of energy. At the end of the special section, the companies indicated how great the contribution and potential of different types of standards is or could be for coping with the energy transition and the energy crisis feared in 2022.

Relevance and concern

At the beginning of this year's special section, companies were asked to rank the 17 United Nations Sustainable Development Goals (SDGs) according to their importance for their company or industry. Ranking points were awarded for the five most important SDGs: the SDG that was voted number 1 received five points, the one in second place four points, and the one in fifth place one point. This question was already asked in the special section of the German Standardisation Panel 2019 and 2021. This year, 1,547 participants answered this question.

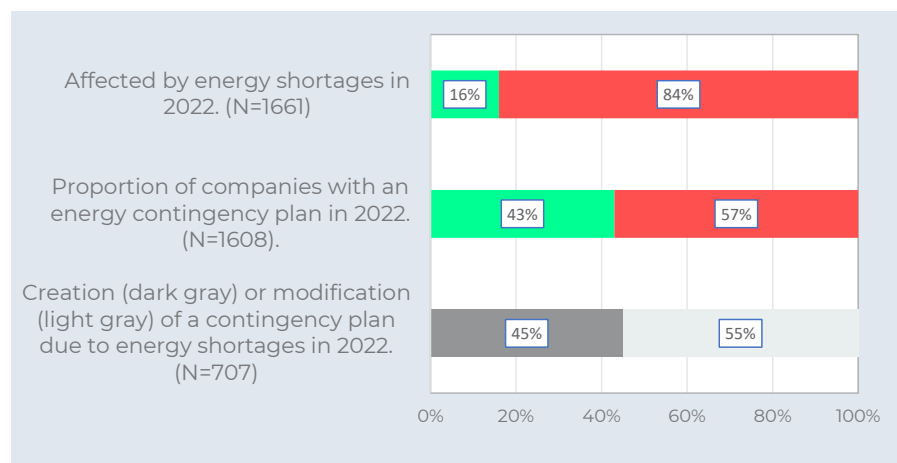
⁸ When the questionnaire was formulated in early summer 2022, it was expected that serious energy shortages and rationing could have occurred in autumn 2022. For this reason, some of the questions are formulated against the background of this situation, i.e. questions about affectedness or access to energy.

To the first of the two questions, whether the companies were affected by energy shortages in 2022, 1.661 of the companies participating in the survey answered. The evaluation shows that only 16% of the participating companies were affected by energy bottlenecks at all. Here, very large companies (17%) and companies from the chemical and pharmaceutical industry (28%), the construction sector (22%), and the metal sector (21%) were particularly affected. Companies that stated that they were affected by the energy crisis had the opportunity to describe in another open question to what extent they were affected by the energy shortages. The manual analysis of these answers showed that the impact was rather mild, and most companies were mainly affected in the form of price increases.

Figure 19

Affectedness of energy shortages and emergency plan

■ Yes
■ No



The next question aimed to find out whether the companies were prepared for power cuts during an emergency. The evaluation of the 1.608 responses shows that slightly less than half of the companies (44%) have an emergency plan. Most of these are very large companies (>1.000 employees). Most of the companies with an emergency plan come from the chemical and pharmaceutical industry (68%), automotive (63%), and metal production (57%).

If the companies indicated that they had a contingency plan, they were directed to a follow-up question. The aim here was to find out whether the emergency plan was created or changed due to the energy crisis in 2022. Here, 707 participants still answered. For 45% of these companies, the feared energy crisis in 2022 was a reason to create an emergency plan, for 55% of the companies, the energy crisis was a reason to change the already existing emergency plan. The contingency plan was drawn up mainly by medium-sized (55%) and large companies (up to 999 employees) (50%) and companies from the construction sector (69%) and professional and scientific services (70%). Changes to the plan were most common among services (59%), information and communication (56%), and energy (57%), as well as small (56%) and very large companies (58%).

Machine and plant construction leading in the use and own production of renewable energies

At the same time, we asked the participants about their use and own production of renewable energies. When asked whether they already use green electricity, 1.558 of the participants answered. Almost 60% of the respondents

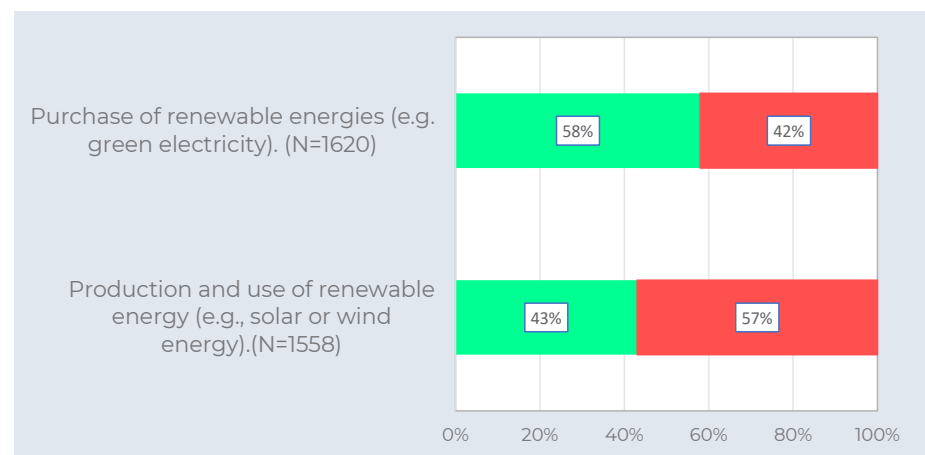
confirmed this, and 42% stated that they do not yet use renewable energies. Renewable energies are mainly purchased by very large companies, with small and medium-sized companies in second place. The largest share of companies that already purchase green energy comes from the information and communication sector (76%), the automotive sector (70%), the construction sector (67%), and the chemical and pharmaceutical industry (66%). A subsequent open question showed that it is mostly green electricity, followed by solar energy and hydrogen.

About the own production of renewable energies (for example solar and wind energy) within the company and their use, it was shown that 43% of the 1.620 respondents generate renewable energies themselves and 57% do not yet do so. The companies that use these energies themselves mostly produce solar energy, which they feed directly into the electricity circuit themselves. While 52% of the very large companies produced renewable energy themselves, only 31% of the small companies reported producing their energy. The sectors that most often produce their energy are vehicle construction (59%), the energy sector, and electrical engineering (51% each).

Figure 20

Use and production of green electricity

■ Yes
■ No



Mostly small companies work in energy-related standardisation bodies in 2022

In addition, the companies were asked about their activities in energy-related standardisation committees in 2022. The evaluation of the almost one thousand responses to this question showed that one-fifth of the companies (23%) are already involved in energy-related committees. Mostly small companies (31%) are active here, followed by medium-sized (28%), very large (26%), and large (15%). The sector evaluation produced the following picture: most of the companies that participate in an energy-related committee come from the area of universities, associations, federations (n = 141), vehicle construction (n = 110), and the service sector (n = 97).

Standards and the access to affordable and clean energy

This part of the survey aimed to find out whether standardisation, about other factors, can contribute to the achievement of the seventh United Nations Sustainable Development Goal, access to affordable and clean energy.

For a better highlighting of the individual effects, the question was divided into the

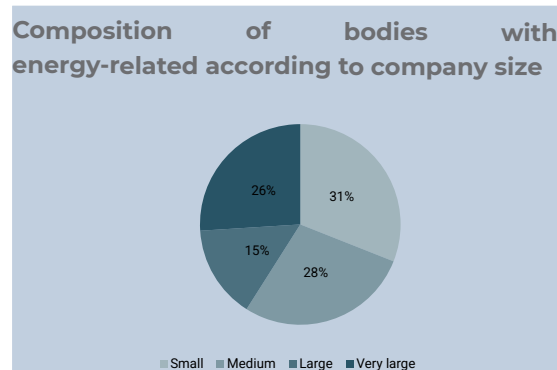
three sub-goals of SDG 7.

These are:

1. significantly increase the share of renewable energy in the global energy mix by 2030 (hereafter: use of more renewable energies)
2. double the global rate of increase in energy efficiency by 2030 (hereafter: more energy efficiency).
3. ensure universal access to affordable, reliable, and modern energy services by 2030 (hereafter: access to (affordable) energy).

Figure 21

Participation in standardisation body with energy reference in 2022
N=233 - 1005



According to Horbach and Rammer (2022), who collected data as part of the Community Innovation Survey (CIS) on the extent to which being affected by climate change influences the development and implementation of (eco-) innovations, four external and internal factors were selected that most influence companies. These are

External Costs

(e.g., through increased prices of fossil energies)

Political Measures

(e.g., the rationing of energy for certain industries)

Customer demand

(e.g., for products made from renewable energy).

Internal adaptation costs

(e.g., by installing solar panels on the roof of the building).

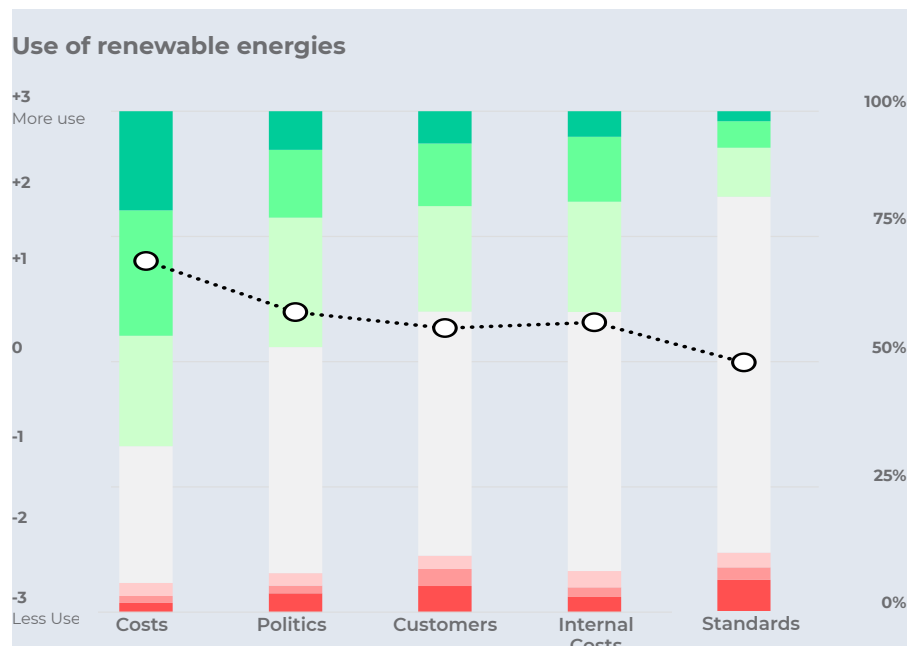
Standards

(e.g., DIN EN ISO 50001, DIN EN 15603)

external costs (e.g. due to increased prices of fossil energies), political measures (e.g. rationing of (fossil) energies for certain industries), customer demand (e.g. for products made from renewable energies), and internal adaptation costs (e.g. due to the installation of solar panels on the roof of the building). Standardisation was added as another factor to understand, in comparison with the other factors, whether standardisation is considered to have an impact on the achievement of SDG 7. The participating companies could tick whether the factors had no impact at all (-3) or a great impact (+3) on the achievement of the individual sub-goals, more energy efficiency, expansion of renewable energies, and access to energy. The evaluation of the 1196 to 1233 responses clearly shows that external costs are perceived as the most important factor and standardisation has no significant influence.

Figure 22

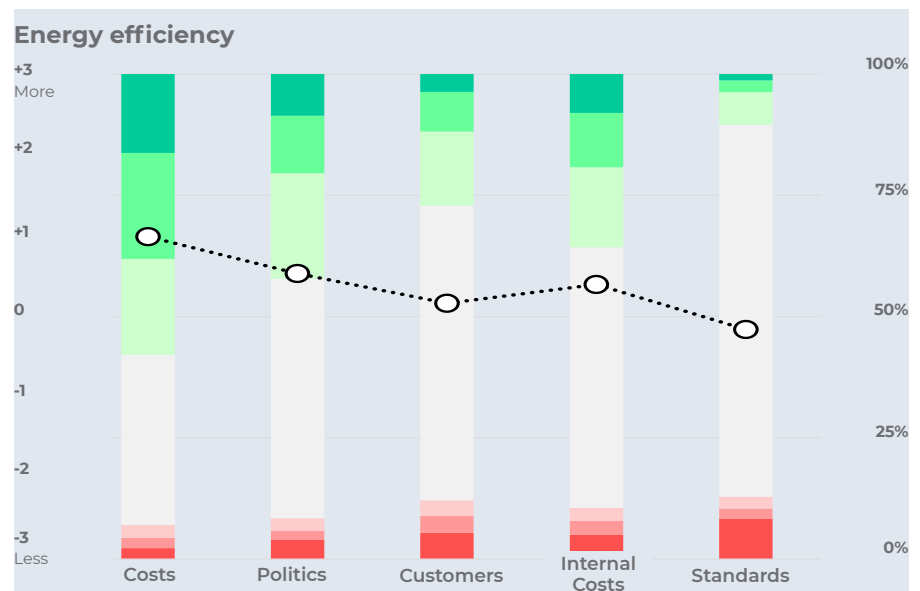
Effect of various factors on the use of renewable energies.
From -3 (dark red) to +3 (dark green).
N = 1.151 - 1.109



The first sub-question of this section was: "How have the following factors affected the development of renewable energies in your company?" The participants could choose between -3 (less use) and +3 (more use) on a nominal scale. The evaluation of the answers clearly shows that external costs are perceived as the most important factor influencing the expansion of renewable energies in companies, here, an agreement of more than 50% can be found. This is followed by political measures, customer demand, and internal costs. Standardisation comes in last place. It is also noteworthy at this point that 72% of the respondents stated that standardisation has no influence at all (0, neutral) on the expansion of renewable energies in the company. SMEs and large companies rate the role of standards in this context more negatively than very large companies. The optics and medical technology sectors (mean value of -0.60) assess the role of standardisation particularly negatively. In contrast, it is assessed more positively by the automotive sector (mean value of 0.11), the energy sector (mean value of 0.13), and public administration (mean value of 0.18).

Figure 23

Effect of various factors on the expansion of energy efficiency. From -3 (dark red) to +3 (dark green).
N = 1.249 - 1.291



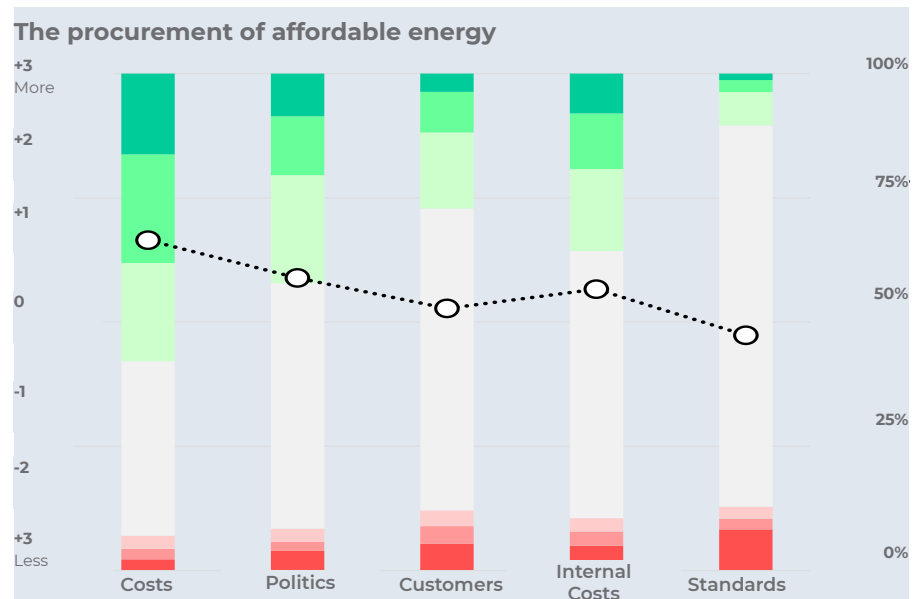
Following this question, the participants had the opportunity to describe in more detail in an open question how standards affect the use of renewable energies in the company. There were 301 responses. These clearly show that standards support already existing commitment in the area of sustainability (example opinion: "The standards support our personal commitment to sustainability within the development and manufacture of products. They set the legal basis and also exert pressure for quick and sustainable implementation within the company"), but more binding force would be important to increase the use of renewable energies. Against this background, standardisation is also described as too slow (example opinion: "Increases costs, stifles individual development, takes forever for a standard to be harmonised in Europe, [...]").

In the second part of this section, the question was asked how the above-mentioned factors have affected the increase in energy efficiency in the companies. The participants could decide on a scale between -3 (more) and +3 (less). The evaluation of the results shows that also at this point the factor "costs" is perceived as the most relevant, followed by the political measures, internal costs, and customer demand.

Standardisation is again in last place with a very high proportion of participants ticking 0 (neutral) (71%). Compared to the area of renewable energies, a larger number of people seem to be convinced that all the factors asked about influence increasing energy efficiency. The mean value for standardisation at this point is 0. SMEs rate the role of standardisation as more negative, while large and very large companies record a positive mean value. The chemical and pharmaceutical industry voted particularly positively for the standardisation factor in the comparison (mean value of 0.32), as did the energy sector (0.26). The medical technology and optics sector as well as the testing and certification industry voted particularly negatively for the role of standardisation in achieving greater energy efficiency, with mean values of - 0.42 and - 0.26 in comparison.

Figure 24

Effect of various factors on the procurement of energy. Scale from -3 (dark red) to +3 (dark green).
N = 1.195 - 1.234



The last question in the section dealt with the third sub-goal, access to (affordable and clean) energy. Originally, this sub-goal referred to the area-wide supply of electricity in areas that are not yet supplied with electricity. Due to the looming energy crisis in the summer of 2022, this goal was transferred to German industry and deals with the procurement of affordable energy, which is why the question was: "How have the following factors affected access to affordable energy in your company?" Again, it can be seen that external costs are perceived as the most important factor for the decision to access affordable energy, followed by policy measures, internal costs, and customer demand. In this question, the standardisation factor scores even more negatively with a mean value of -0.16 than in the previous questions. Here, too, the high number of neutral votes of 77%, which rate standardisation as a factor with no influence on access to affordable energy, is striking. Companies of all sizes rate the role of standardisation as negative in this context, with the smaller companies more strongly than the larger ones. All sectors except the energy sector, automotive, and public administration rate the role of standardisation negatively on average, especially certification and testing (-0.48) and optics and medical techno-

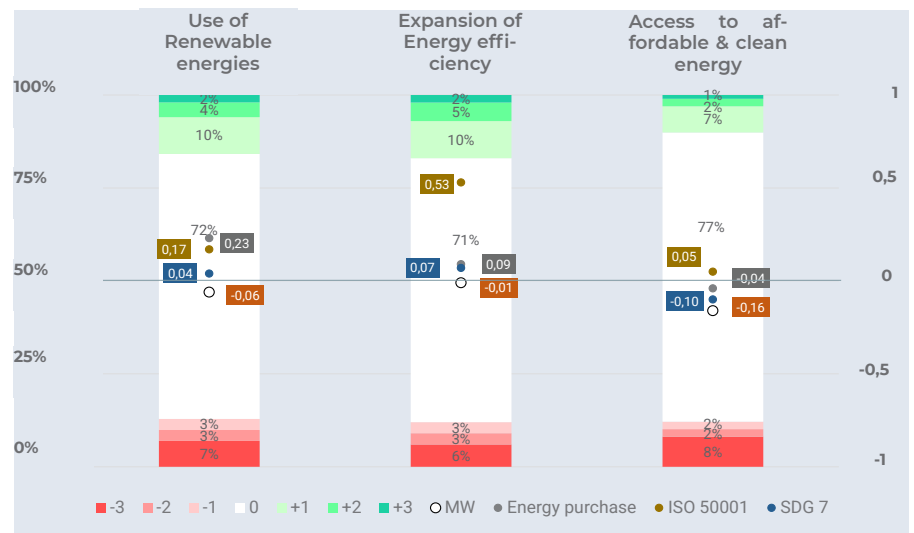
logy (-0.55). The open question, "Please describe how standards have affected the procurement of energy in your company", was answered by 185 of the participating companies. 159 of these answers were manually coded as neutral, which can be interpreted in the form that standards are perceived as a factor without influence on the procurement of energy within companies.

Participation in committees & certification with ISO 50001 has a positive influence on perception of standardisation as a factor for more clean and affordable energy

To investigate in more detail whether existing engagement with the topic of energy may have a positive influence on the assessment of the role of standardisation in achieving the sub-goals of SDG 7, the voting behaviour of three specific sub-groups was examined in more detail: Individuals working in energy-related bodies (n = 231), companies that consider SDG 7 to be

Figure 25

Impact of standardisation on the three sub-goals of SDG 7 with mean values for various sub-groups. From -3 (dark red) to +3 (dark green). N = 1.195 - 1.234



Where standardisation can support the energy transition

The third question area of the special section deals with the potential that standardisation has about the energy transition and the transition to the exclusive use of renewable energies. In addition to a question on the potential and the actual contribution of different types of standards to addressing the energy crisis/supporting the energy transition, two open questions were asked: firstly, to what extent standards are needed to support industry in the energy transition, and secondly, where there are still insufficient standards.

The evaluation of the first question shows, after manual coding of the 302 responses, that the answers are overwhelmingly positive (85%), and standards are perceived as important for the implementation of the energy transition. Areas that were mentioned here were primarily evaluability/comparability (n=48) and fair competition (n = 41). Regarding the areas in which standardisation could be used even more, the evaluation of the 94 responses showed that the areas of hydrogen (n = 15) and life cycle assessments (n = 12) have the potential to contribute to an improvement.

Potential exceeds actual contribution made by standardisation

Figure 26

Potential and already realised contribution of standards to combating and managing climate change. Scale: -3 (not at all; corresponds to 0) to +3 (very much, corresponds to 7), N = 1.049 - 1.169

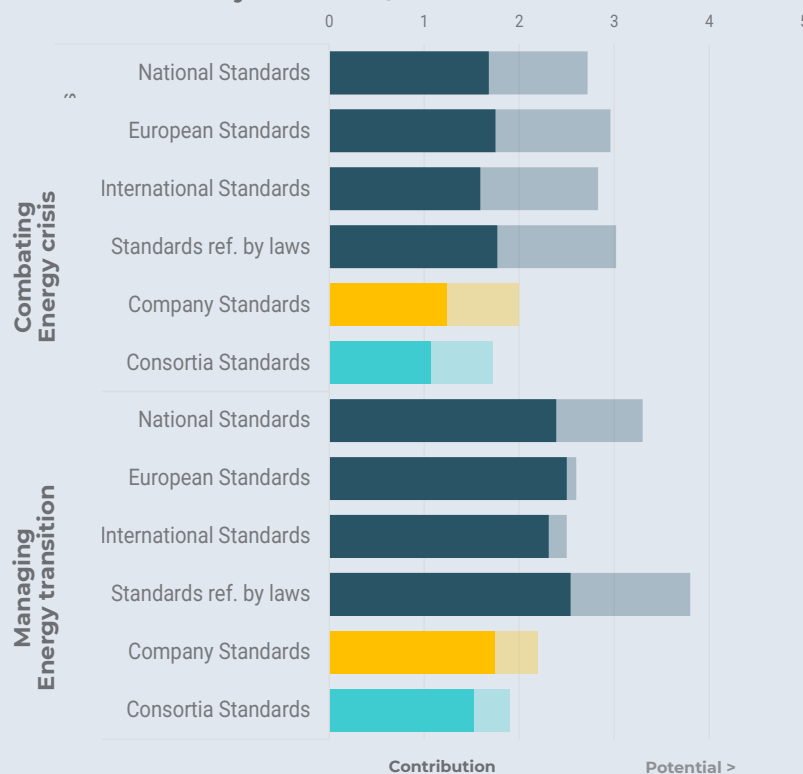
Potential

How much do you think norms or standards could potentially help in combating the energy crisis / managing the energy transition?

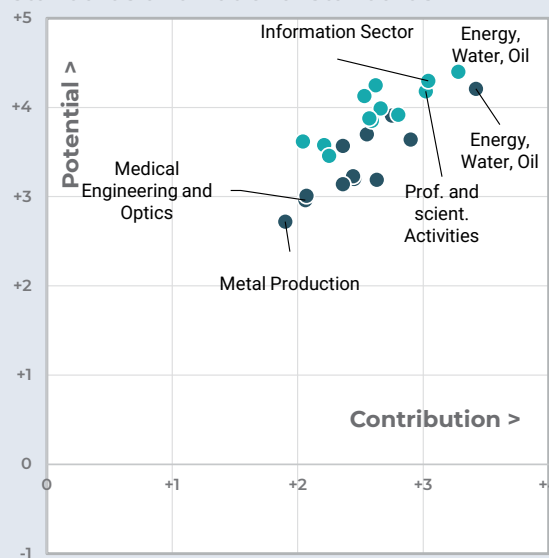
Realised Contribution

In your opinion, how much do norms or standards already support the fight against the energy crisis / the implementation of the energy transition?

How much do ... already contribute/ How much can ... contribute?



Potential and contribution to the energy transition of harmonised European standards and national standards



Standards referenced by law

National Standards

Furthermore, it was to be determined whether, in the view of the standardisation experts, the energy crisis and the energy transition can be addressed through standardisation and whether the potential here has not yet been exhausted. The results show that also about energy issues, all types of standards receive approval both in support of the energy turnaround and in combating the energy crisis.

In both cases, the potential of the different types of standards exceeds the value of the actual contribution. Standards referenced in laws (e.g., DIN EN 16247 or DIN VDE 4105) and European standards receive the highest approval. The companies in the energy, water, and oil sector, professional and scientific services, and information and communication sectors attribute the highest ability to standards referenced in legislation to contribute to the energy transition (see Figure 26 below). Consortia standards received the least approval. If we now compare the values for the energy transition and the energy crisis, it becomes clear that the values for support for the energy transition are higher.

To support the energy transition, it becomes clear that national standards for supporting the energy transition receive higher approval for the contribution already realised than international standards. The attributed potential of national standards exceeds that of European and international standards. This is especially true for the energy, water, and oil sector. One possible explanation for this voting behaviour is that the energy transition, in particular the implementation of the Renewable Energy Sources Act, is perceived as a national project and can be addressed at this point in the context of national standardisation.

Overall, Figure 25 makes it clear that, from the respondents' point of view, standards are already contributing to supporting the energy transition and to combating the energy crisis anticipated in early summer 2022. At the same time, however, it becomes clear that the potential that standards could bring to these processes has not yet been exhausted.

CONCLUSION

Key findings from the eleventh survey of the German Standardisation Panel

The year 2022 has stirred up fears in German private households and industries that have not been confronted in previous decades. The question of the security of energy supply has not had to be asked since the 1950s. Favorable energy prices have been an important pillar of the success of the German industry. The results of the survey show that many fears were unfounded in the early summer of 2022, as ultimately only one sixth of the standard-setting companies were affected by energy shortages. About the role of standardisation in ensuring energy security and in supporting the more efficient use of energy or the use of renewable energies, it became apparent that standardisation is still perceived as a factor without significant influence. However, engagement with the topic, for example through involvement in an energy-related standardisation body or certification with ISO 50001, seems to contribute to the perception of standards as being more relevant.

This is underlined by the assessment of different types of standards for supporting the implementation of the energy transition and combating the energy crisis expected in early summer 2022. Here, the assessment of the respondents shows that the potential of different types of standards is higher than the current contribution they make. Especially about national standards for the implementation of the energy transition, this result is clear. Here, the potential has not yet been exhausted. Furthermore, European harmonised standards are the standards with the most influence.

The overall perception of formal standards and technical specifications remained largely unchanged compared to the previous year. The influence of these on economic success factors even increased. However, the rating of company standards and consortia standards decreased sharply. Regarding the influence that standards have on the achievement of success factors, the trend is slightly upwards. This can possibly be explained by the uncertain geopolitical situation, which leads to companies preferring to work in known and established structures. The assessment of technical interoperability and market access and legal security is more negative for company standards, consortia, and de-facto standards than for formal standards and technical rules, which underlines this explanation. For competitiveness and quality enhancement alone, these non-formal standards play a key role.

The establishment of resilience and sustainability as further aspects linked to corporate success shows an interesting picture. As the assessment fits seamlessly into the picture of the other assessments of aspects linked to corporate success, one can see

how seriously these factors are already taken in the everyday work of standard-setting companies. The influence of different types of standards is not different for both factors from the assessment of competitiveness. Formal standards, technical specifications/ rules, and internal company standards. The choice of SDG 13, climate action, as the most important sustainability goal for standard-setting companies, also underlines this assumption. The increased ranking of SDG 7, affordable and clean energy, among the top five shows that the topics of energy security and energy sustainability are gaining relevance overall.

Another interesting development is the increase in planned initial certifications with ISO 14001 compared to previous years. ISO/IEC 27001 was able to record the most initial certifications carried out in 2021. The work in committees is stable compared to the previous year. The same applies to the existence of a standardisation department in companies and the corresponding effort. No decline can be seen here. The number of employees is stable and compared to previous years there is a tendency to spend the same amount or even more on a standardisation department in a company.

The role of standardisation in achieving SDG 7 is assessed as not important or neutral by an overwhelming majority of German standard-setting companies. As the evaluation of subgroups shows, standardisation experts who already deal with and are involved in the topic of (sustainable) energy use have a more positive perception of the role of standardisation in achieving the goals. However, small companies are particularly critical of the role of standardisation in achieving the SDGs.

To strengthen the role of standardisation for sustainable, affordable, and efficient energy use in the future, it will be important to involve standardisation experts and companies more in working on the topic. Promoting the benefits of ISO 50001 certification could also contribute to a more positive perception and strengthening of the role of standards. Like the expansion of climate protection, the role of standardisation is not perceived as binding enough. This could be helped by better coordination between the standard-setting organisations and the legislators. Stricter guidelines for the consideration of clean and renewable energy in the standardisation process as well as more educational work on the part of the standardisation organisations would also be conceivable.

SURVEY DETAILS

The German Standardisation Panel is conducted by the Department of Innovation Economics at the Technical University of Berlin (TU Berlin) and is financed and supported by DIN and DKE.

To present representative results for the companies involved in standardisation, the survey results are being compared to DIN's data on companies active in standardisation. Furthermore, in the medium term, data from the innovation surveys commissioned by the German Federal Ministry of Education and Research since the 1990s and from the study on the research and development of economic statistics by the "Stifterverband für die Deutsche Wirtschaft" are being used to complete the picture.

For the subsequent surveys, it will be essential to motivate previous participants to participate in the following survey waves to establish a helpful panel structure. Finally, other businesses will need to be encouraged to participate in further surveys to gain a broader, more representative database.

Catalogue of questions

The goal of the German Standardisation Panel is to measure not only the expenses and effort of companies investing in standardisation, i.e., the activities in standardisation organisations but also their utilisation of the results of this work, that is, the application and implementation of standards and specifications. The questionnaire was divided into four sections:

1. Importance of formal and informal standards and specifications
2. Standards and the access to affordable and clean energy
3. Formal and informal standardisation activities
4. General information

The complete questionnaires of all surveys since 2012 can be found on the DNP website: normungspanel.de.

GLOSSARY

Formal standardisation

In Germany, “formal” national standardisation (also called “full consensus standardisation”) is defined as the “systematic unification of material and immaterial subjects carried out by all stakeholders working in consensus for the benefit of society as a whole” (see DIN 820-1:2014-06 Standardization – Part 1: Principles, definition from DIN 820-3:2014-06). Provisions are laid down with full consensus and are adopted by recognised formal standards institutes (such as DIN German Institute for Standardization and DKE German Commission for Electrical, Electronic & Information Technologies of DIN and VDE). Formal standardisation has a high level of legitimacy due to its well-established processes.

In addition, the international and European standards organisations form a network of national standards institutes. DIN’s staff administers international and European standardisation activities carried out in Germany, ensuring that all rules of procedures and guidelines are complied with. They prepare, carry out and follow up meetings of international and European bodies and of the corresponding German “mirror” committees (see www.din.de).

Informal standardisation

In Germany, a differentiation is made between “Normung” (“formal”, full consensus standardisation) and “Standardisierung” (“informal” standardisation that is not based on full consensus). The latter process results in specifications, such as the “DIN SPEC”, or consortia standards, for example. Usually, these are developed by a temporary body or standardisation Consortia. Full consensus and the involvement of all stakeholders are not required.

National standards organisations

DIN, the German Institute for Standardisation, is a privately organised provider of services related to standardisation and the development of specifications. By agreement with the German Federal Government, DIN is the acknowledged national standards body representing German interests at all levels, including the European and international standardisation organisations. DIN’s purpose is to encourage, organise, steer, and moderate standardisation and specification activities in systematic and transparent procedures for the benefit of society while safeguarding the public interest. DIN publishes its work results and encourages their implementation. Some 30,000 experts contribute their skills and experience to the standardisation process, which is coordinated by 400 DIN employees (for further information see www.din.de).

The **DKE German Commission for Electrical, Electronic & Information Technologies** of DIN and VDE is a modern, non-profit service organisation that ensures that electricity is generated, distributed, and used in a safe and rational manner, thereby serving the good of the community at large. DKE is the German national organisation responsible for developing standards and safety specifications in electrical engineering, electronics, and information technology. Its work results form an integral part of the collection of German standards. VDE specifications also form the VDE Specifications Code of safety standards (see www.dke.de).

European standards organisations



In Europe, standards are drawn up by the three officially acknowledged European standardisation organisations: the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC), and the European Telecommunications Standardisation organisation (ETSI). The national standards bodies of CEN and CENELEC's 33 members work together to draw up European standards, which are adopted by the members at the national level (see <http://www.cencenelec.eu/aboutus/Pages/default.aspx>).

Each country is represented within CEN and CENELEC by one member body. German interests are represented by DIN within CEN and by the DKE at CENELEC. Each DIN standards committee decides on active participation at the European level. This work is supported by a working committee designated as the "mirror committee" to the relevant European body. This committee determines the German position on a particular subject and sends delegates to the European committees to represent this position and participate in the consensus-building process.

ETSI is responsible for drawing up globally applied standards for the information and communications technology (ICT) industry. This includes television and radio technologies as well as the internet and telecommunications. The European Union has officially recognised ETSI as a European standardisation organisation (see www.etsi.org/about).

Figure A.1

Structure of international standardisation (Source: www.din.de)

	National level Example Germany	Regional level Example Europe	International
General			
Electrical Engineering			
Telecommunications			

International standards organisations

ISO International Organisation for Standardisation and **IEC International Electrotechnical Commission** are private organisations whose members are the national standardisation organisations. The secretariats of ISO and IEC technical committees are held by these member organisations, who come from all over the

world. DIN's standards committees decide on active participation at the international level and on the adoption of an international standard as a national standard. The main bodies of ISO and IEC are the respective general assemblies; other bodies include policy-making bodies such as the council and technical executive committees, such as the Technical Management Board. Standards work is carried out by national delegations and their experts acting in technical committees, sub-committees, and working groups.

Another international body that sets rules is the **ITU International Telecommunication Union**. The ITU is a subsidiary organisation of the United Nations and is based in Geneva, Switzerland. Recommendations of the ITU are developed by government representatives of the 191 member countries and representatives of companies and regional and national organisations. They serve as guidelines for legislators and companies in the member countries.

Formal standards

In Germany, formal standards are developed by the standards committees in DIN and DKE with the full consensus of all stakeholders and are largely recommendatory in nature. However, if they are cited in a law or contract, their use may become mandatory. They "provide, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at achieving the optimum degree of order in a given context" (definition as in *DIN EN 45020:2006 Standardisation and related activities – General vocabulary (ISO/IEC Guide 2:2004)*). Standards define the state of the art at the time of their publication, and contain recommended properties, test methods, safety requirements or dimensions, for example (see www.din.de).

The most important designations for standards:

- **DIN** – National German Standard
- **DIN VDE** – National electrotechnical German Standards containing safety-relevant or EMV-specific provisions
- **DIN ISO, DIN IEC, DIN ISO/IEC** – German translation of an International Standard published by ISO and/or IEC and adopted, unchanged (but sometimes with national elements such as National foreword or National footnote), as a German standard
- **DIN EN** – Official German version of a European standard. All European standards are to be adopted, unchanged, by the members of the European standardisation organisations CEN/CENELEC/ETSI
- **DIN EN ISO** – Official German version of a European standard which is the unchanged adoption of an International Standard

Specification (e.g. DIN SPEC)

In Germany, a "specification" such as the "DIN SPEC" is the result of an "informal" standardisation process, and describes products, systems, or services by defining characteristics and laying down requirements. Like standards, such specifications are developed by experts in formal standardisation organisations such as DIN. However, they differ from formal standards in that full consensus and the involvement of all stakeholders are not required. Like specifications, consortia standards are drawn up in an "informal" standardisation process. They are developed based on

a majority decision by a selected group of companies and organisations taking the form of a “Consortia”.

De-facto standards

De-facto standards are not developed by specific consortia but are a consequence of market demand. De-facto standards are also known as “industry standards” and are developed in what is called an “informal” standardisation process. All standards drawn up by industrial interest groups are de-facto standards.

Technical rules

Technical associations actively participate in DIN’s standards committees to represent the interests of their members at the national, European, and international levels. Some of these associations also draw up their own technical rules (see www.din.de), which contain recommendations on how to comply with legislation, a regulation, or an established technical procedure. Although they are not legal documents in themselves, they can become legally binding or were cited in a law or regulation, for example in building regulations. Technical rules published by organisations such as VDI, VDMA, and VDE are not drawn up with a full consensus.

Company standards

Company standards are developed and adopted by companies themselves and or by cooperating businesses (e.g., suppliers). For example, their use can be mandatory for a company’s suppliers.

Panel survey

A panel survey is a survey carried out among the same economic players (persons or companies) on the same topic and over time.



Contact

Hermann Behrens

DIN e.V.
Burggrafenstraße 6
10787 Berlin
Telephone: 030 2601-2691
Telefax: 030 2601-42691
Mail: hermann.behrens@din.de
Internet: www.din.de

Johannes Koch

DKE Deutsche Kommission Elektrotechnik
Elektronik Informationstechnik
in DIN und VDE
Merianstraße 28
63069 Offenbach am Main
Telephone: 069 6308-268
Telefax: 069 6308-9326
Mail: johannes.koch@vde.com
Internet: www.dke.de