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Watts Next?

Mapping the European and German Battery Storage Status and Developments

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22+ YEARS EUPD Research

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- Total vis a vis Residential PV Installations and Average System Sizes
- Residential BESS Installations in Europe
- Average Residential BESS System Sizes in Europe
- BESS in Germany (Status and Outlook)

PV Installer Monitor © 2023/2024 | EES Installer Monitor© 2023/2024

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About EUPD Research

EUPD Research – Research, Certification, Consulting

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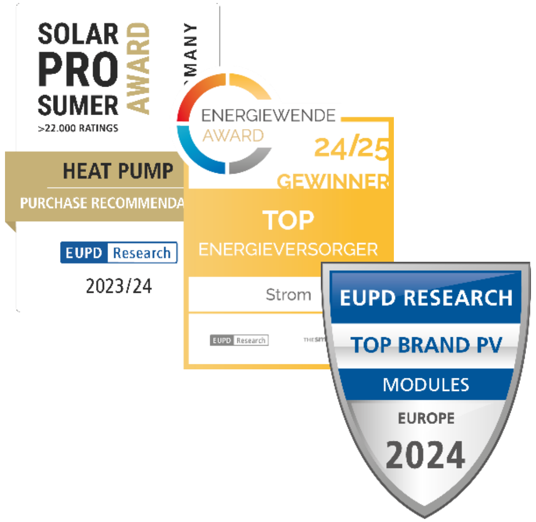
Market Research

- Market analyses
- Competition analyses
- Product analyses
- Price analyses

EUPD Cert

Certification

- Top Brand
- Customer Satisfaction Seal
- Energy Transition Award
- SolarProsumerAward



EUPD Consult

Exclusive Consulting

- Within the scope of strategic consulting projects, we focus on the review, further development or redevelopment of the company's orientation, we rethink concepts, measures or the positioning within the competitive environment and shape growth paths and business models
- Our future-oriented consulting services analyze both the corporate environment and the fundamental objectives of the client

EUPD Research | References (Extract)

E3/DC ENERGY STORAGE
AIKO
IBC SOLAR
Vaillant
JinKO Solar
SUNTECH

Qcells
Trinasolar
ENPHASE
SMA
KOSTAL
BayWa r.e.

JA SOLAR
SUNGROW Clean power for all
HUAWEI
SOLARWATT
hoymiles
Alpha-ESS

sonnen
SENEC
BYD
ASTRONERGY
LONGi
GROWATT

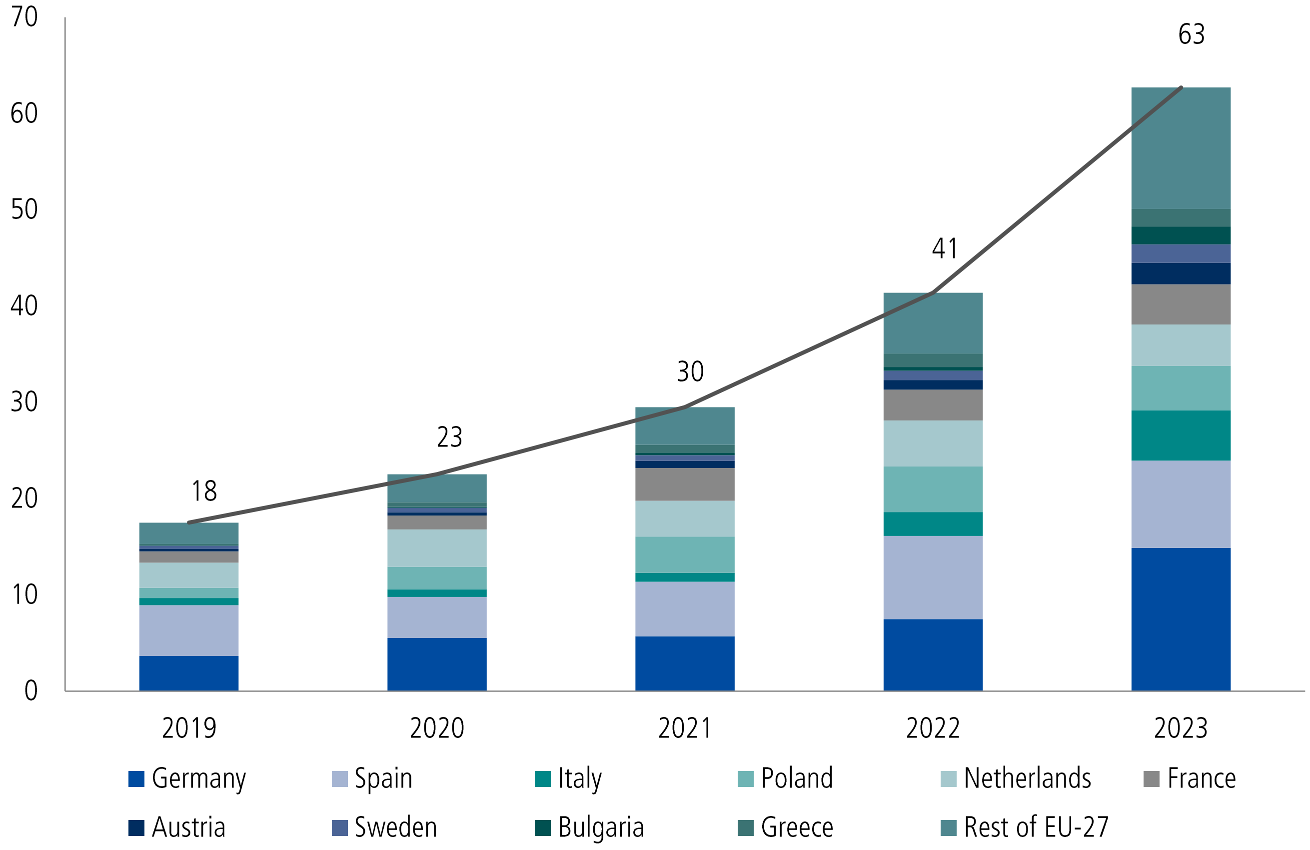
memodo
LG
APsystems ALTENERGY POWER
VIESSMANN
REC
SAMSUNG

SUNPOWER
Heckert Solar Die Energiekompetenz
krannich Solar
SOLAX POWER
VARTA
DMEGC SOLAR

EU-27 Solar PV Status and Outlook

Annual Installed Solar PV Capacity

EU-27 | 2019-2024E | in GWdc



EU-27 has a 51% YoY surge in new solar PV capacity in 2023 and has added ~63 GWdc

- 2023 was another record year for the EU-27 PV installations with the market installing a total of ~63 GWdc, leading to a YoY growth of 51%. This record number can mainly be attributed to the EU member states setting ambitious PV targets and taking big steps to reach their climate targets
- Germany followed by Spain, and Italy were the top 3 PV markets in the European Union in 2023 with total newly installed capacity of ~29.2 GWdc in just these three markets (47% of the EU market in 2023)
- Germany was the largest PV market in Europe installing around 14.9 GWdc in 2023

Source: EUPD Research GET-Matrix© 2024

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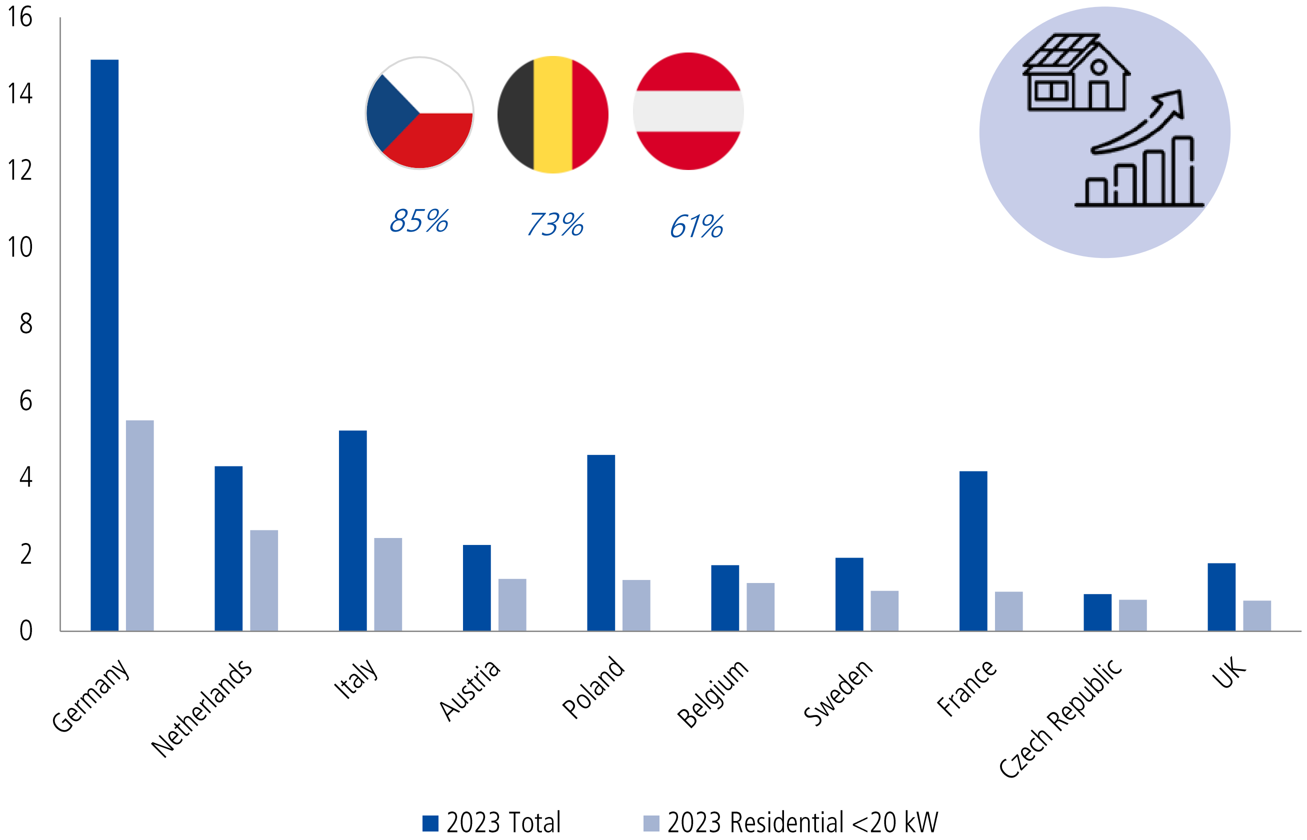
Annual Installed Solar PV Capacity

2023 total vis a vis residential | in GWdc



The top residential PV markets in Europe installed ~18 GW of new capacity in this segment in 2023

- As the new PV installations are accelerated, and the appetite and incentives for self-consumption of electricity increased, the residential PV installations will also increase
- Germany, followed by the Netherlands and Italy were the largest residential PV markets in the EU in 2023 with regard to market size (+10 GW combined in 2023)
- However, it should be noted that the markets dominated by the residential segment are Czech Republic, Belgium and Austria (3.45 GW)

Source: EUPD Research GET-Matrix© 2024

The AVG Residential PV System Sizes

<20 kW 2023

EU average residential system size <20 kW in 2023

The markets with largest average residential (<20 kW) system sizes in 2023

The average residential PV system size in the Europe is less than 10 kW but is bound to increase

The largest residential system sizes are installed in:

Austria
Sweden
Norway
Switzerland
Czech Republic

Followed by Denmark, Germany and Poland

Source: EUPD Research GET-Matrix© 2024

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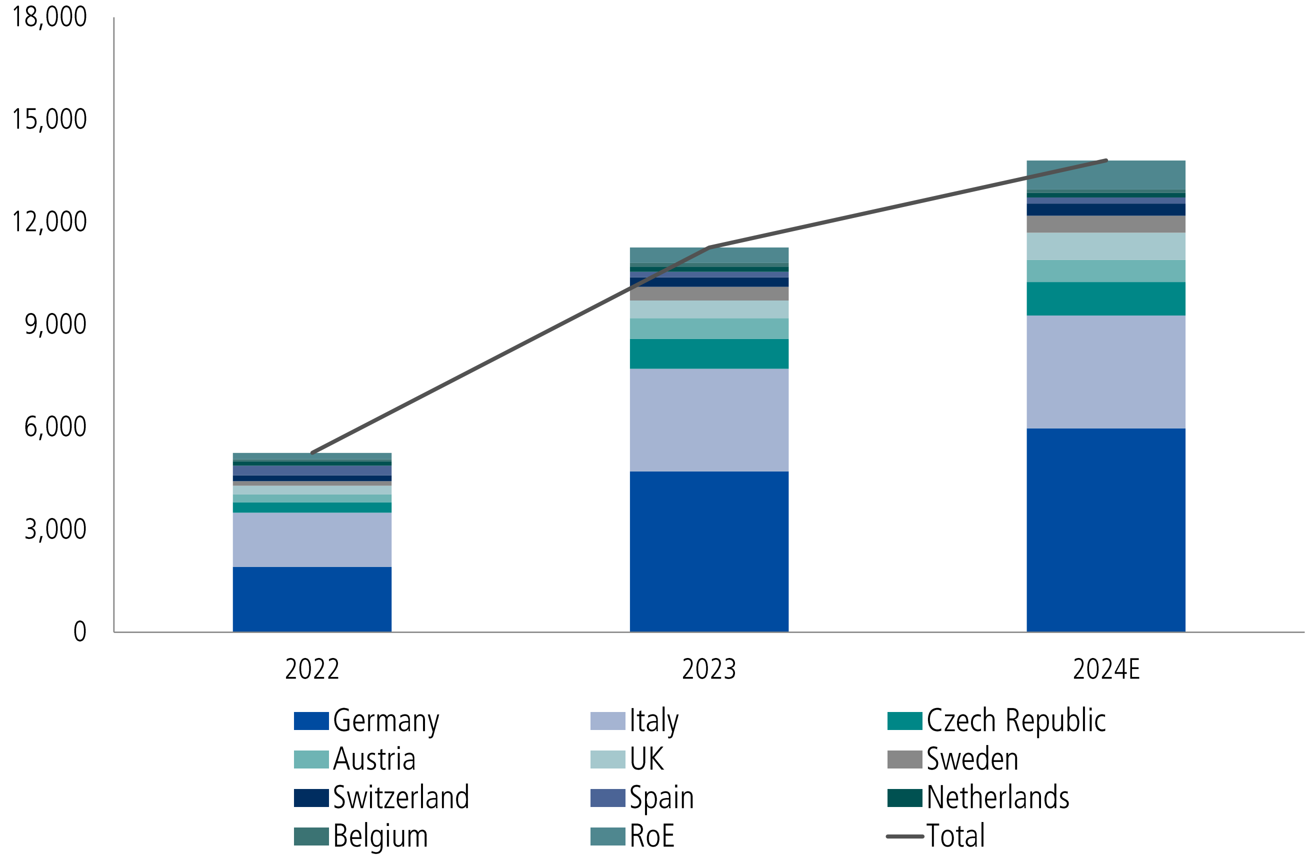
Annual Installed BESS (<20 kWh)

Europe | 2022-2024E | in MWh



Europe has registered 2022-2023 YoY growth rate of 115% of residential BESS systems

- From a base of 5.2 GWh of new BESS systems in 2022, Europe managed to reach ~11.3 GWh by the end of 2023
- The top two residential BESS markets in Europe last year were Germany, Italy
- Czech Republic has also joined the ranks as the third biggest residential BESS market
- Another emerging market has been Sweden which installed ~400 MWh of new residential BESS in 2023.

Source: EUPD Research GET-Matrix© 2024

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The AVG Residential BESS System Sizes

<20 kWh 2023

EU average residential system size <20 kWh in 2023

The markets with largest average residential (<20 kWh) system sizes in 2023

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The average residential BESS system size in the Europe is less than 10 kWh

The largest residential system sizes are installed in:

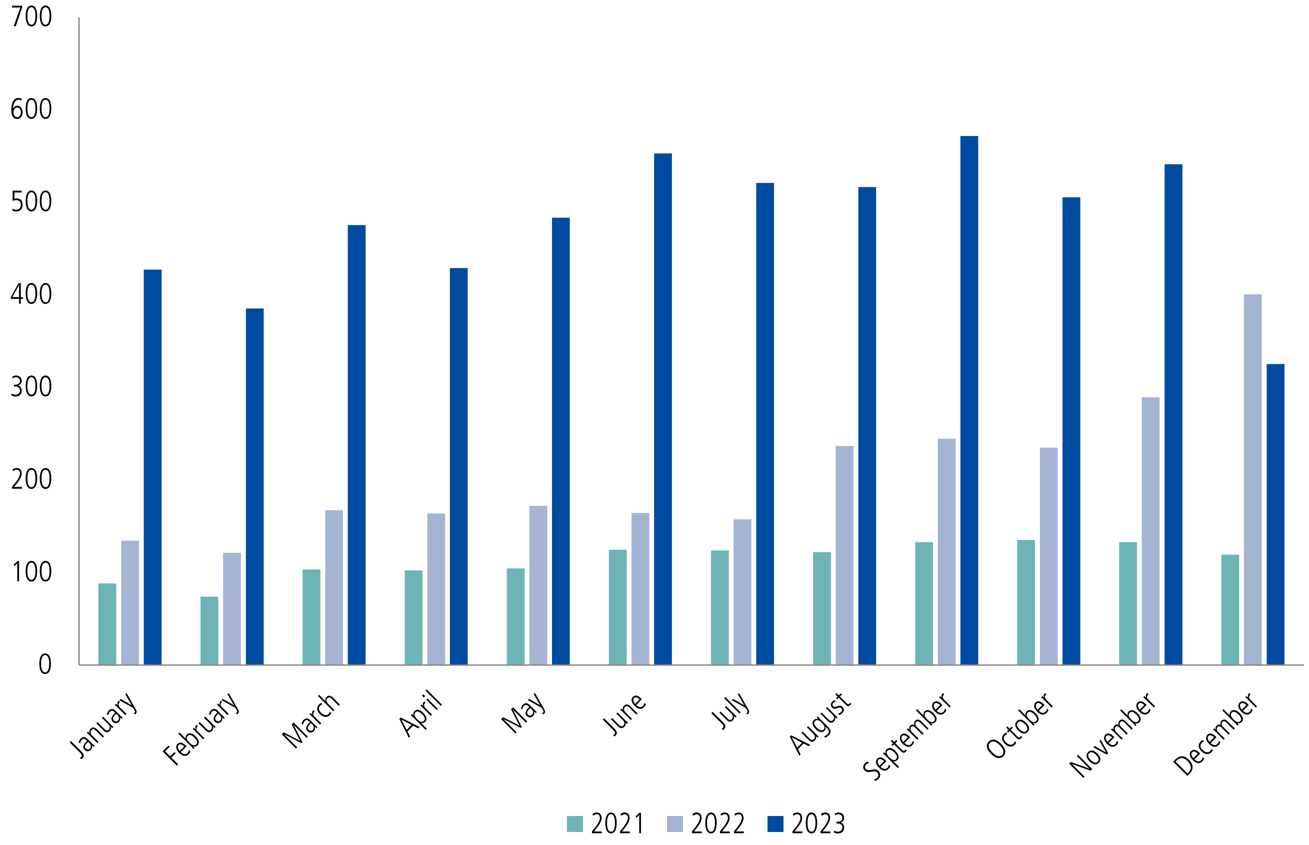
Switzerland
Austria
Sweden
Czech Republic
Norway

Followed by Italy, Denmark and Germany

Source: EUPD Research GET´-Matrix© 2024

2023 Newly Installed BESS

Germany | 2021-2023 Monthly | in MWh



Between 2021-2023, 9.6 GWh of BESS has been installed in Germany in all segments

- The BESS installations in Germany has been significantly increasing over the course of the last three years
- From a total new installation of 1.3 GWh in 2021, Germany managed to jump to 2.5 GWh in 2022 and 5.7 GWh in 2023
- Germany registered a YoY growth of 83% and 131% in 2022 and 2023 respectively

Source: rwth, EUPD Research GET-Matrix© 2024

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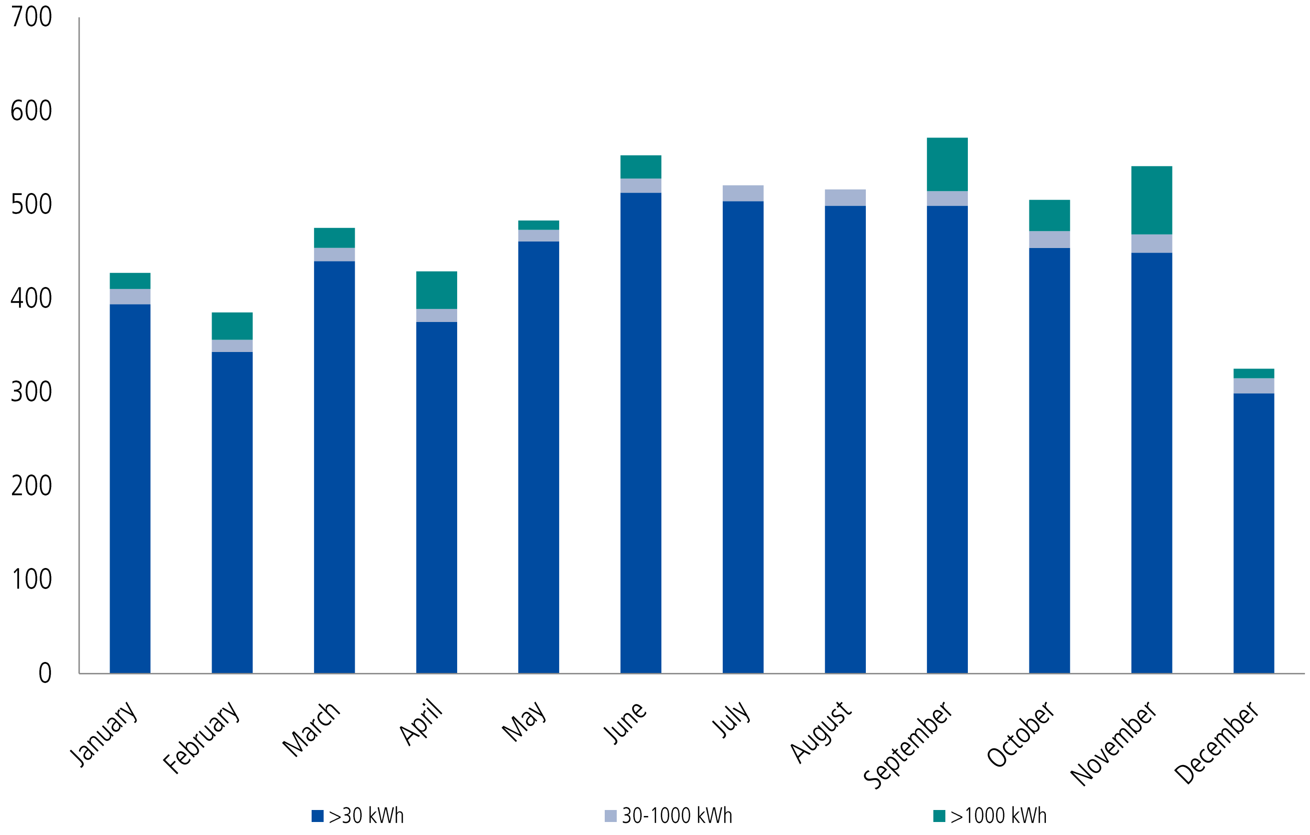
2023 Installed BESS

Germany | 2023 Monthly | in MWh



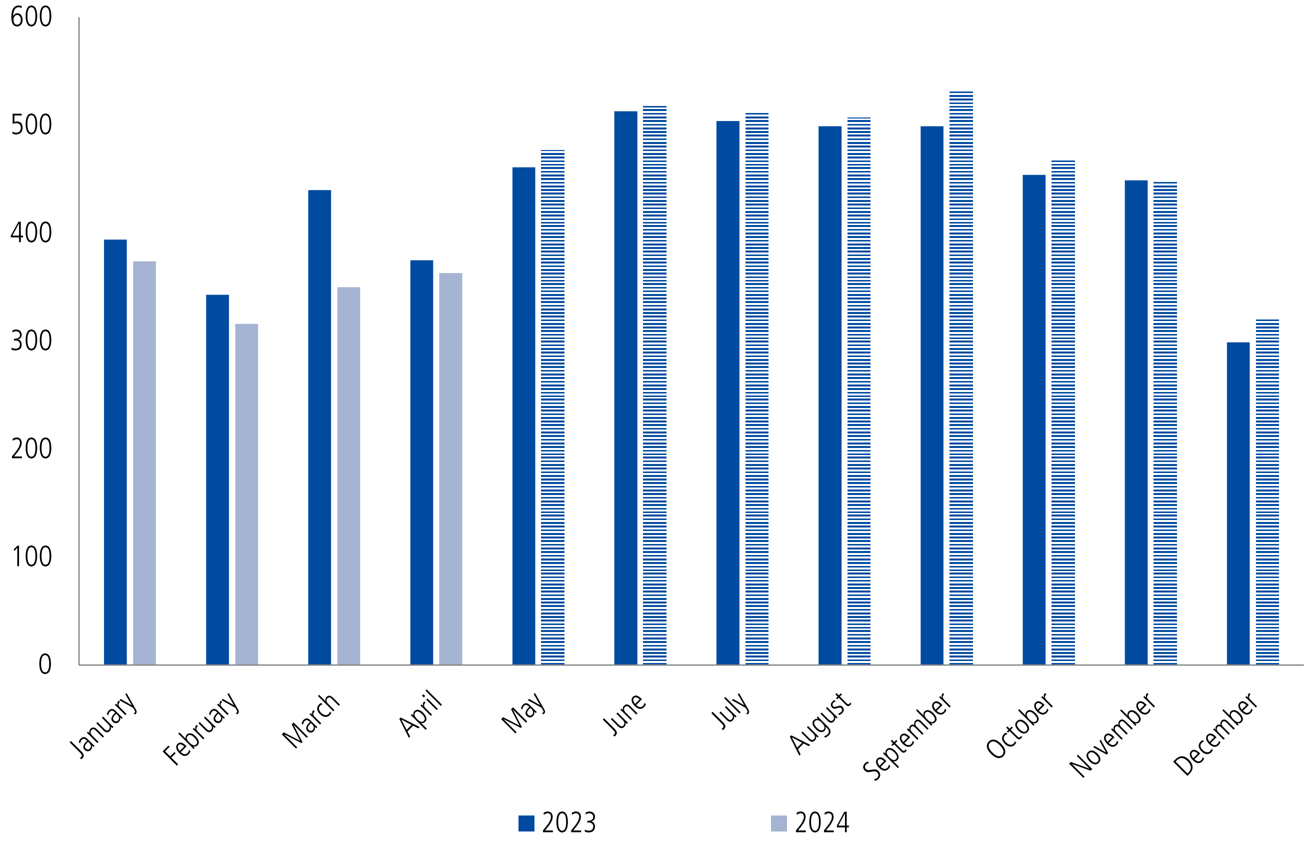
Germany BESS is dominated by the residential segment

- Germany installed 5.7 GWh of storage in 2023 across all segments
- Of this amount:
  - <30 kWh: 90%
  - 30-1000 kWh: 3%
  - >1000 kWh: 7%

Source: rwth, EUPD Research GET-Matrix© 2024

2023 Installed BESS (<30 kWh)

Germany | 2023-2024 Monthly Comparison | in MWh



Germany installed ~1.6 GWh of BESS in all segments in the first 4 months of 2024

- The BESS system installations have slightly decreased during the first four months of 2024 (1,630 MWh down from 1,717 MWh last year same period)
- Quite optimistically Germany will be installing ~5.2 GWh (<30 kWh)
- In case there is no revision for the better in the data Germany BESS installations will experience a slight decline in new installations in this segment for the first time since 2021

Source: rwth, EUPD Research GET-Matrix© 2024

Insights from the PV Installer Monitor 2023/2024 Germany

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PV InstallerMonitor© 2023/2024 | EES InstallerMonitor© 2023/2024 Introduction

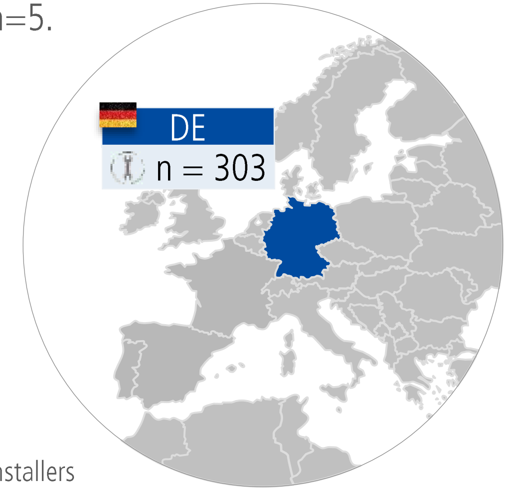
Research design and methodology

The PV InstallerMonitor© 2023/2024 | EES InstallerMonitor© 2023/2024 presents the results of a comprehensive empirical survey with a survey group of PV installation companies. All questions of the survey refer to systems that were installed as building-applied (rooftop) or building-integrated solutions.

As only a limited number of big project developers exist and they might not have participated in the survey, the residential segment is overrepresented and the large-scale segment is underrepresented in the sample.

EUPD Research reached a total number of 303 interviews in the German market.

Brands are depicted if they were named at least n=5.



n = number of surveyed installers

Primary research

The following research methodology is used:

- Survey type: Mainly quantitative CATI survey (computer assisted telephone interviews by an external service provider); partly non-assisted online participation (around 14 percent of the sample)
- Target country: Germany
- Surveyed group: Installers of PV systems
- Questionnaire design: Open and closed questions

Advantages:

- Efficiency: Rapid data collection
- Relatively low interviewer influence (e.g., gesture, mimic)
- Standardization: Consistent interview process

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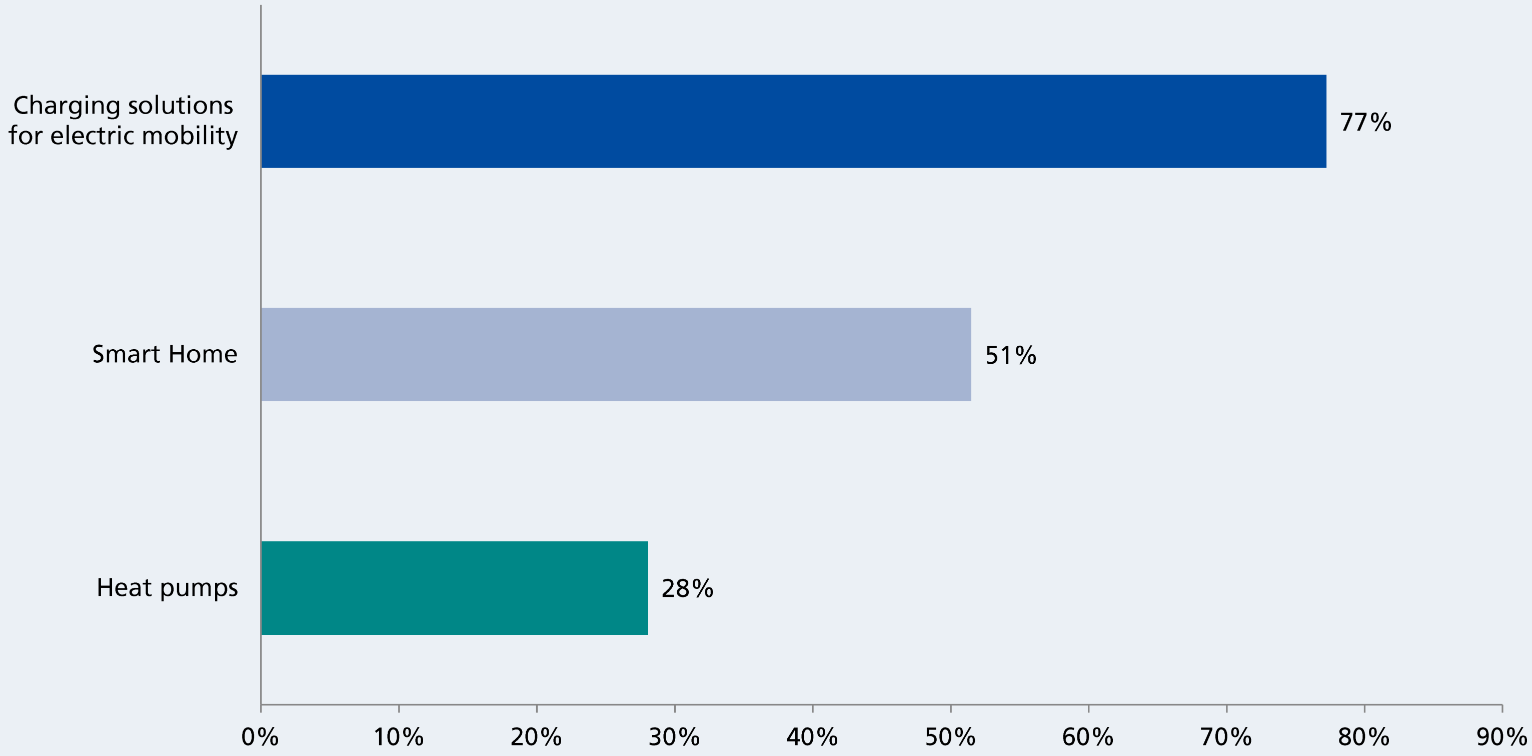
Content of the PV InstallerMonitor© 2023/2024 | EES InstallerMonitor© 2023/2024

- Market Data:
  PV market information: installations and funding schemes
- Sample Description:
  Description of surveyed installers and head groups (core business, technologies in portfolio, PV employees, PV installations, % PV turnover, BAPV/BIPV)
- Business Situation:
  Catchment area, media usage, waiting time for installation, situation with finding skilled personnel, openness towards new brands
- Procurement:
  Procurement channels for PV components, positioning of wholesalers, type of wholesalers, Net Promoter Score
- Modules:
  Procurement, brand awareness, avoided brands, market penetration of brands, Net Promoter Score, motivation to put best rooftop product in portfolio, products on stock/for direct use
- Inverters:
  Procurement, brand awareness, 1/3 phase, market penetration of brands, Net Promoter Score
- Mounting system manufacturers:
  Procurement, market penetration of brands, Net Promoter Score
- Storage Solutions:
  Procurement, storage installations (numbers, AC/DC, high/low voltage, 1/3 phase, new/retrofit installs), brand awareness, avoided brands, market penetration of brands, Net Promoter Score, motivation to put best residential product in portfolio
- HEMS:
  Brands in portfolio or suggestion to use, Net Promoter Score

PV InstallerMonitor© 2023/2024 | EES InstallerMonitor© 2023/2024 General Issues

Further technologies in portfolio

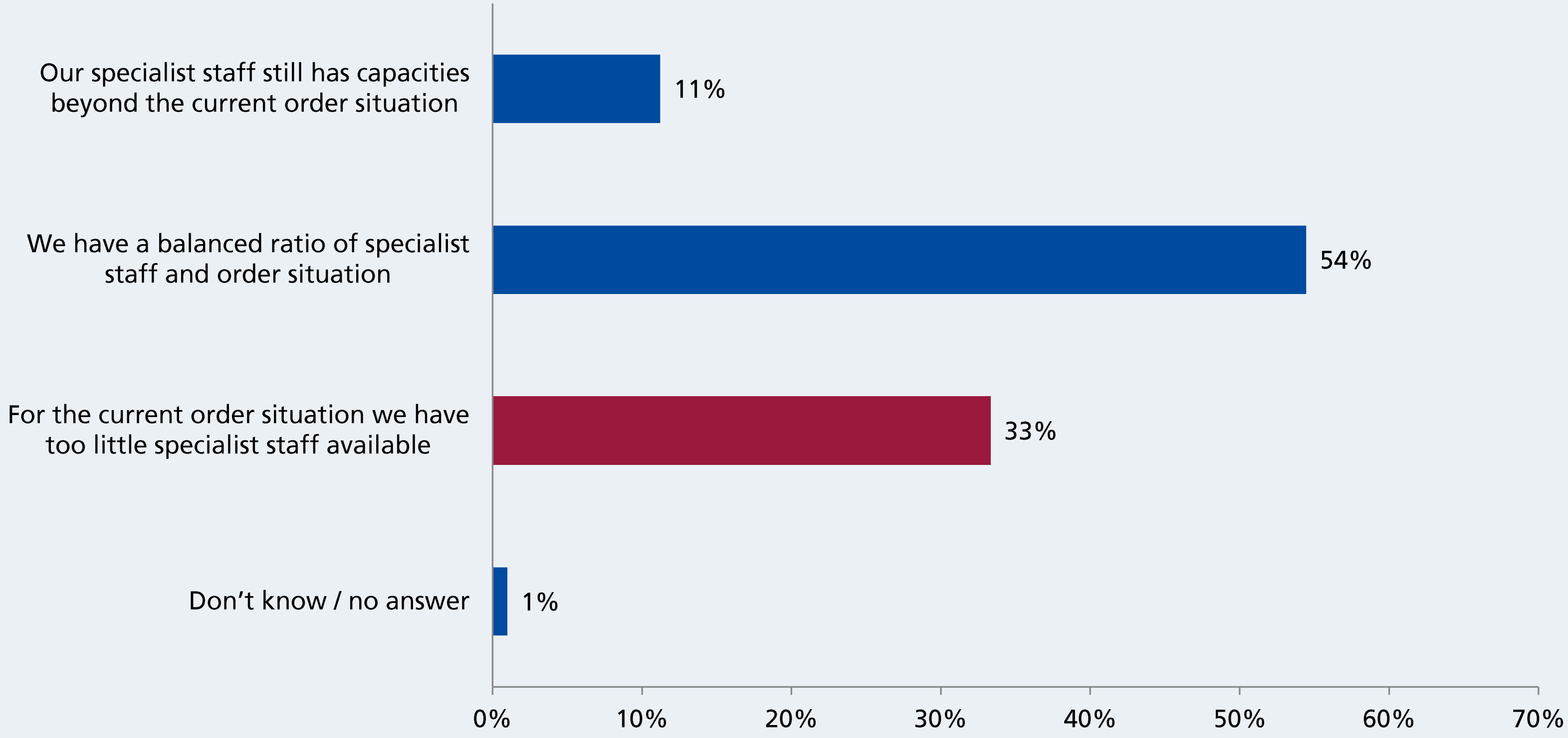


Most of the surveyed companies install charging solutions for electric mobility and smart home solutions in addition to PV systems. 28 percent of installers offer heat pumps.

n=303

Source: EUPD Research 2024

Availability of specialist staff for the installation of PV systems



Last year, around 70 percent of installers stated that they do not have enough specialist staff to meet the demand for PV installations. This year, only one-third of the surveyed installers report such constraints in the current order situation. This shift may suggest a positive development in the labor market situation, but it could also hint at a potential decrease in demand for PV installations in the rooftop segment.

n=303

Source: EUPD Research 2024

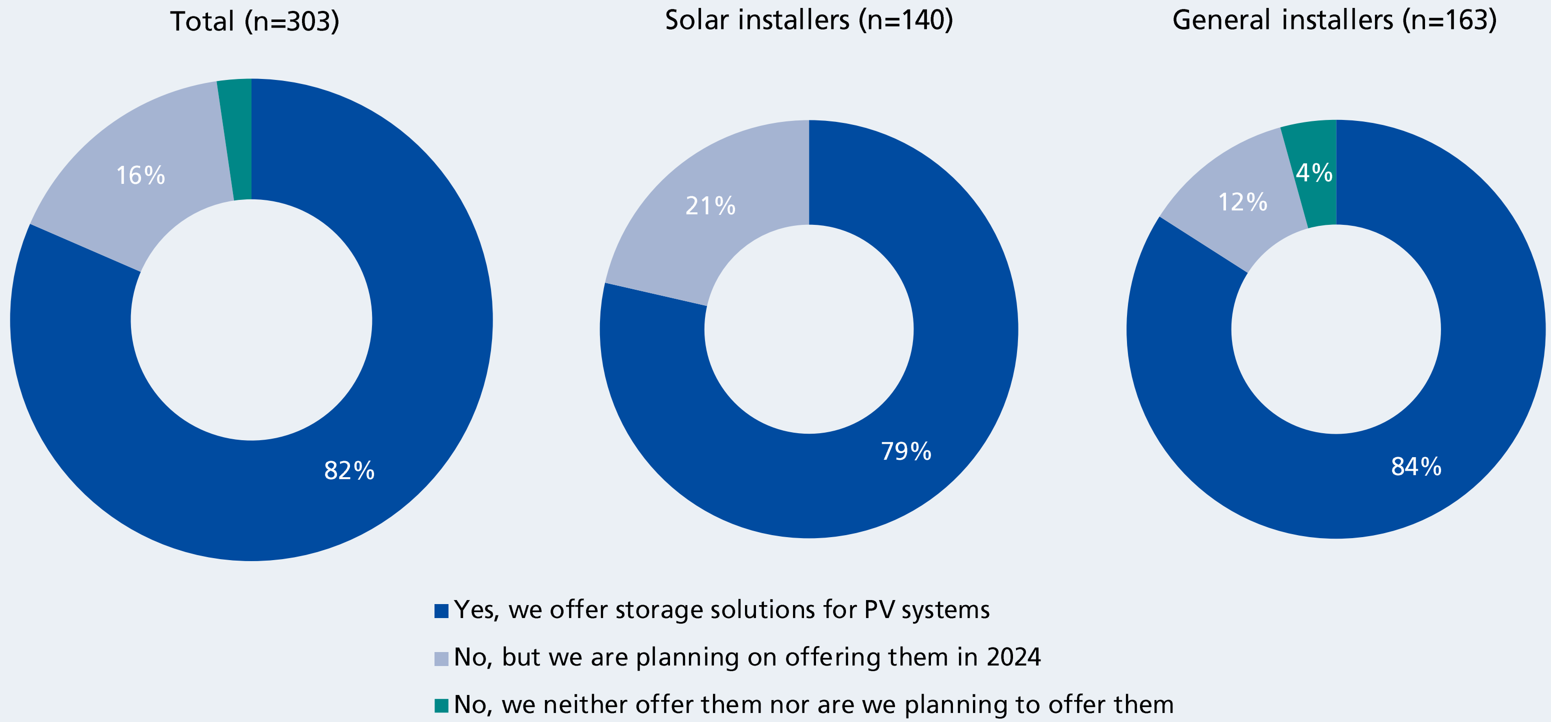
What are your key sources of information or media format you use to inform yourself about PV components and technology?

Installers obtain information about PV components and PV technologies mainly from manufacturer websites and generally via the Internet. Only a small proportion of installers say that social media or technical influencers are their main source of information on PV topics.

n=303, multiple answers
Source: EUPD Research 2024

PV InstallerMonitor© 2023/2024 |
EES InstallerMonitor© 2023/2024
Storage Solutions

Do you offer storage solutions? | Total & grouped by trade



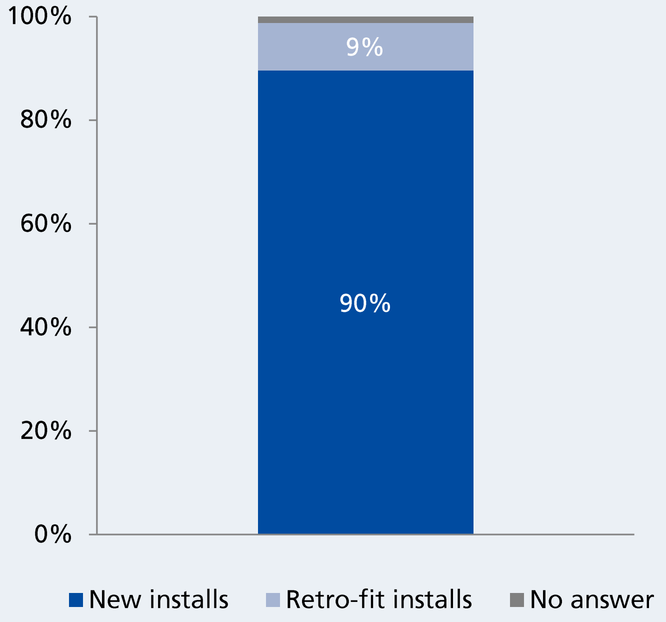
In the current sample, 82 percent of installation companies provide storage systems for rooftop PV installations. Although this figure is lower compared to the previous year, the vast majority of installers in Germany offer storage solutions. 16 percent of respondents intend to incorporate storage into their portfolio in 2024. Only a small number of installers indicate that they do not have plans to introduce storage offerings.

n=303

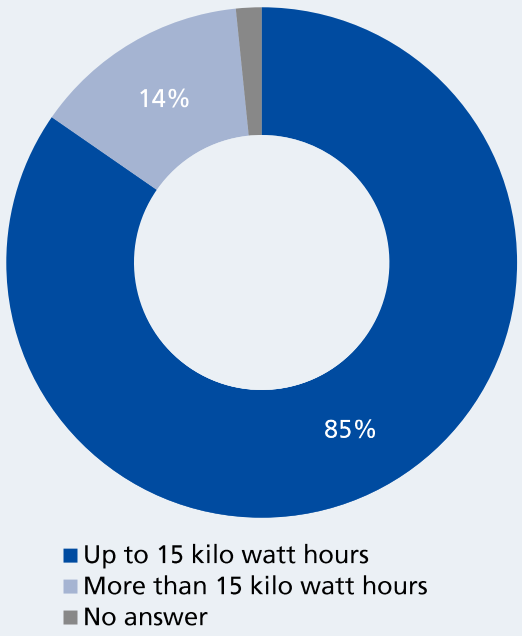
Source: EUPD Research 2024

Installation types & system sizes

New installations & retrofit



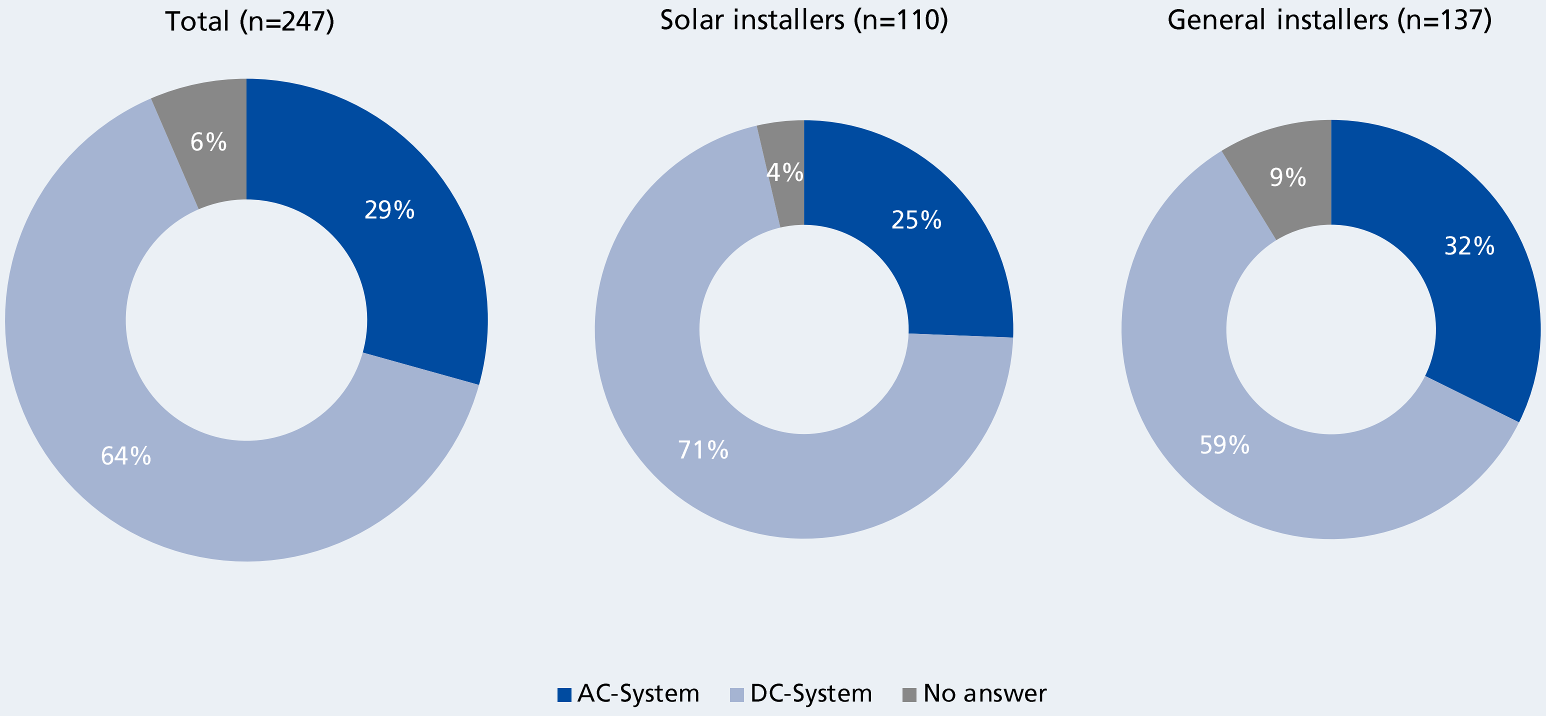
What percentage of the storage solutions you installed in 2023 is divided into the following size classes?



90 percent of the storage installations conducted by installers in Germany are new installations. Concurrently, there is consistent interest in storage retrofits. Approximately 9 percent of installations involve the addition of a storage system to an existing PV system.
85 percent of the installed storage solutions are systems with a size of up to 15 kWh.

n=247
Source: EUPD Research 2024

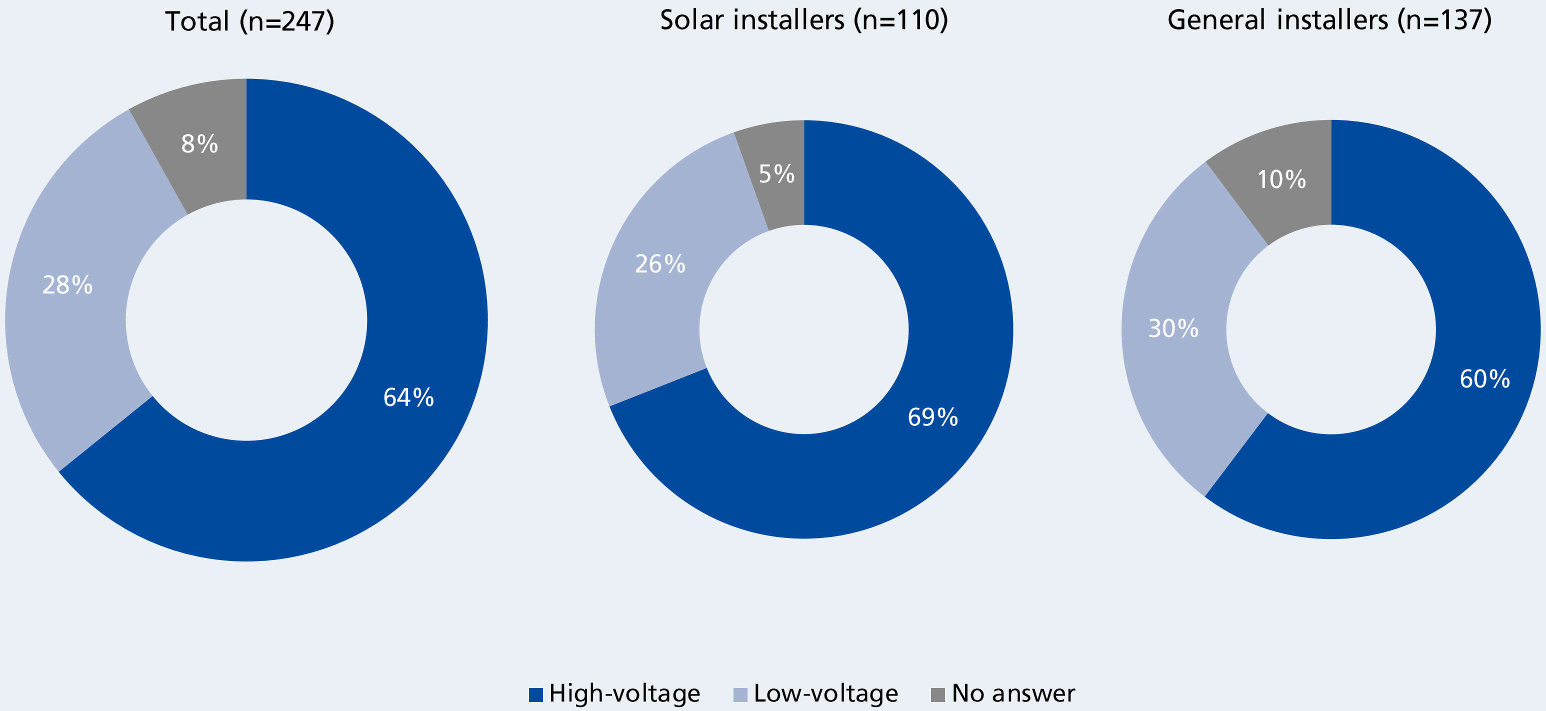
Shares of installed AC-systems and DC-systems | Total & grouped by trade



In recent years, there has been a noticeable transition from AC systems to DC systems. Previously, AC systems were the main choice for installers, but now DC systems have taken over as the prevalent solution.

Source: EUPD Research 2024

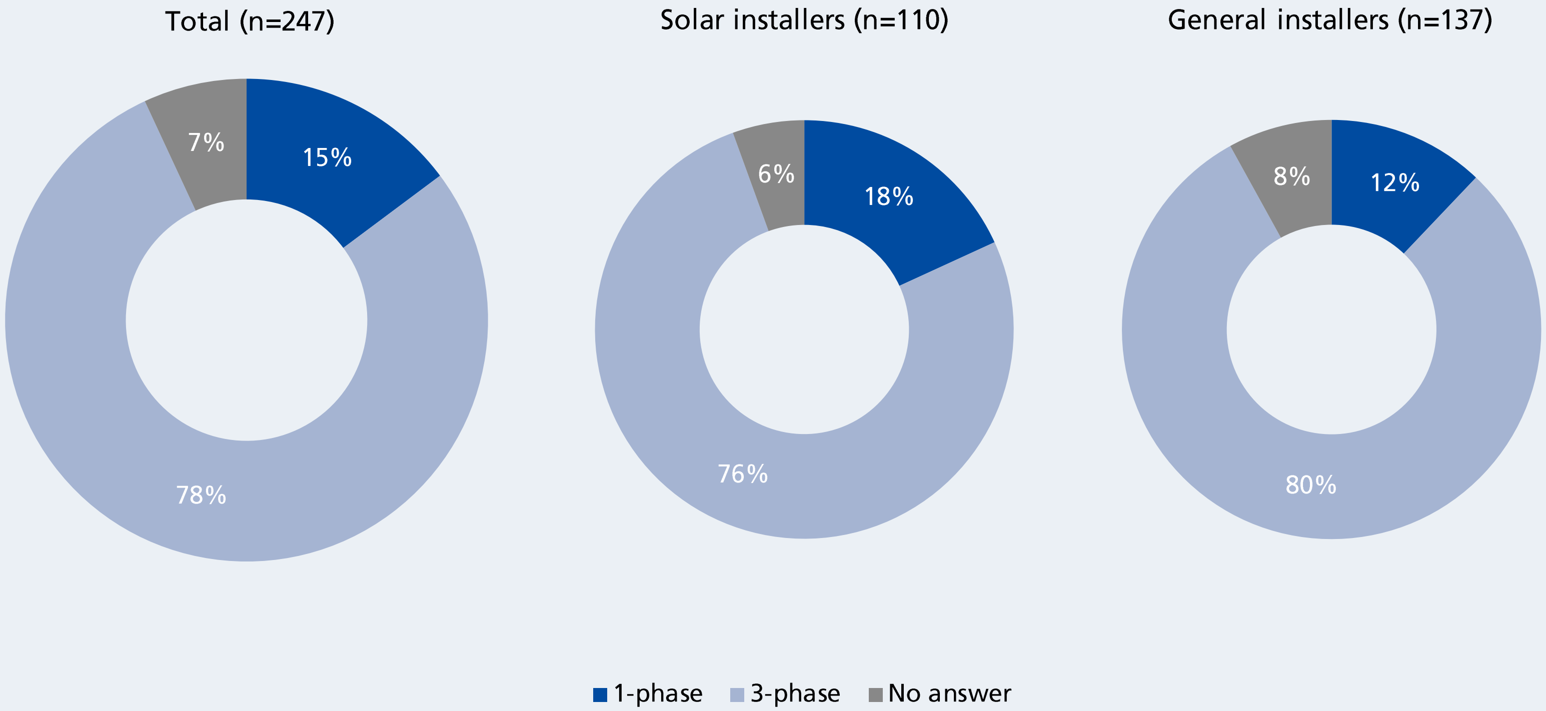
Shares of high-voltage and low-voltage systems | Total & grouped by trade



In Germany, high-voltage storage systems are widely adopted. In alignment with data from 2022, more than 60 percent of surveyed storage systems belong to the high-voltage category, with low-voltage systems comprising approximately 30 percent of the total.

Source: EUPD Research 2024

Shares of 1-phase and 3-phase systems | Total & grouped by trade

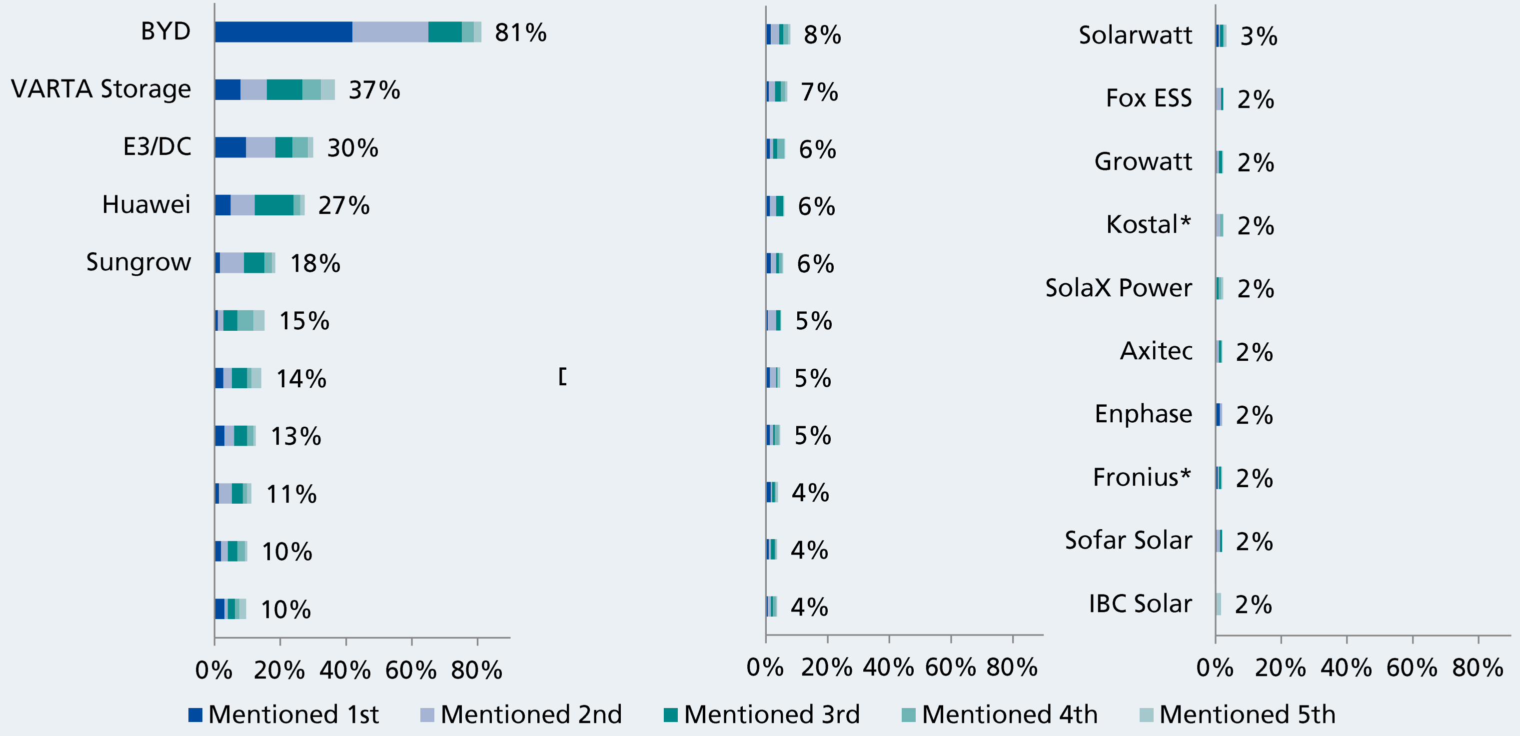


Similar to inverters, a dominance of three-phase solutions can also be observed in storage systems.
Only 15 percent of storage solutions installed in 2023 are one-phase systems.

Source: EUPD Research 2024

GERMANY

Unaided brand awareness



BYD has been the best-known storage brand in Germany since 2019. Over the years, the brand awareness of BYD has consistently risen, surpassing that of other storage brands in the country.
At the same time, other prominent brands like VARTA Storage, E3/DC, and Huawei have also significantly increased their brand awareness in Germany.

* This manufacturer does not offer its own storage system.

n=303

Source: EUPD Research 2024

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Key Facts and Concluding Remarks

2023

2022-2023

- Europe installed 5.52 and 11.26 GWh of residential BESS in 2022 and 2023 respectively

Top 5 residential BESS markets

- Germany
- Italy
- Czech Republic
- Austria
- UK

2024 Outlook

- The market is estimated to still be healthy but the growth is expected to reduce compared to 2023

- The growth in residential storage is also carried by the installers
- The majority of the PV installers in Germany either already offer storage, or are planning to do so

- The lion's share of residential storage installations is in combination with new PV systems
- The retro-fit segment will become relevant in a few years
- The overwhelming part of storage installations in the European markets are in the residential segment

- In terms of technologies, German PV installers have significant preferences
- BYD is the by far most known storage brand, followed by German brands

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Thank you for your attention and please do not hesitate to reach out to us!
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