GERMANY HEAT PUMP GAS DISPLACEMENT STUDY – METHODOLOGY & ASSUMPTIONS

1. From heat-pump sales to gas-replacing heat pumps

Deployment input: German Heat Pump Association/Federation of German Heating Industry (BWP/BDH) heating heat-pump manufacturer sales, used as a proxy for installations.[1]
2025 retrofit allocation: The BWP's March 2026 study estimated 55,700 heat pumps in new buildings and 243,300 in existing buildings, based on projected 2025 building completions.[2] Our calculation updates this allocation using the subsequently published Destatis statistics for 2025.[3] Applying the BWP's new-build factor of 1.03 gives 48,572 heat pumps in new buildings and 250,428 in existing buildings (83.8% of total sales). This updated estimate is broadly consistent with dena's 2025 heating-market figures.[4]
Previous heating system: The model applies the 51% gas-replacement share reported in Forsa's 2025 survey to each year from 2021 to 2024 as a common proxy. For 2025 and the July 2025–June 2026 period, it uses the 58% share from Forsa's 2026 survey. These are assumptions based on adopters' previous heating systems, not observed annual replacement shares.[5]
Historical result: Approximately 496,000 gas-replacing heat-pump unit equivalents sold in 2021–2025. 'Unit equivalents' distinguishes heat-pump sales from larger systems using multiple units.

2. Gas displaced by one gas-replacing heat pump

BWP heat-demand assumption: 15.00 MWh/year of useful heat per household. This is a modelling benchmark rather than the measured demand of each retrofit.[6]
Fraunhofer higher-demand benchmark: Fraunhofer ISE's WP-QS study reports median heat use of 97 kWh/m²/year for space heating and hot water across monitored buildings, and median heated area of 170 m² for single-family homes. Combining the median heat use and mean heated area gives an illustrative reference case, not an observed median annual demand per household. Applying a 1.20 climate adjustment to the 81% space-heating portion, with the remaining 19% for hot water unchanged, gives 19.16 MWh/year of useful heat.[7]
Gas-input conversion: Both useful-heat benchmarks are divided by 0.866, the reference annual gas-boiler efficiency adopted by Fraunhofer ISE, based on earlier field measurements (Hs basis).
[8]**BWP calculation:** 15.00 MWh useful heat ÷ 0.866 = 17.32 MWh gas/year (Hs).
Fraunhofer higher demand: 19.16 ÷ 0.866 = 22.13 MWh gas/year per replacement; 10.98 TWh/year from 2021–2025 sales and 112.73 TWh/year in the accelerated 2035 scenario. As a comparison, Heizspiegel 2026 reports annual gas consumption of 16.51 MWh for a reference 130 m² single-family house, based on 2025 consumption data. Applying this benchmark gives 8.19 TWh/year for 2021–2025 heat-pump sales and 84.12 TWh/year in the accelerated 2035 scenario. These are different heat-demand benchmarks, not statistical confidence bounds.[9]

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[1] BWP (2026). Branchenstudie 2026: Marktentwicklung, Prognosen und Handlungsempfehlungen, p. 10, Table 2.

[2] BWP (2026). Branchenstudie 2026, pp. 12–13, section 2.5, "Anteile Neubau und Bestand".

[3] Destatis (2026). Rund drei Viertel der im Jahr 2025 errichteten Wohngebäude heizen mit Wärmepumpen; Destatis (2026). Baufertigstellungen, GENESIS table 31121-0005 (Accessed 30 October 2026).

[4] dena (2026). Gebäudereport 2026, Chapter 3: Gebäudetechnik, Figure 52.

[5] forsa (2025). Einschätzungen zur Wärmepumpe: Befragung unter Hausbesitzern, p. 3; forsa (2026). Einschätzungen zur Wärmepumpe: Befragung unter Hausbesitzern, p. 4.

[6] BWP (2026). Branchenstudie 2026, p. 32.

[7] Fraunhofer ISE (2025). Wärmepumpen in Bestandsgebäuden: Abschlussbericht WP-QS im Bestand, pp. 34–36, especially p. 36, Figure 13; pp. 6–7.

[8] Fraunhofer ISE (2025). Wärmepumpen in Bestandsgebäuden: Abschlussbericht WP-QS im Bestand, pp. 34–36, especially p. 140.

[9] co2online (2026). Heizkosten pro m²: Vergleich und Rechner, section "Durchschnittlicher Verbrauch und durchschnittliche Heizkosten (EFH)".

3. Historical gas displacement

Annual gas displacement: retrofit heat-pump units × gas-replacement share × 17.32 MWh of avoided gas per year.
BWP estimate: 8.59 TWh/year from 2021–2025 sales. This is a full-year operating rate, not cumulative displacement over those five years.
Cumulative displacement: Heat pumps are assumed to operate for half of their installation year and for a full year thereafter. BWP estimated that 80,000–100,000 heat pumps were held in wholesale and installer inventories at the beginning of 2024. The model uses the midpoint of 90,000 units and assumes these entered operation in 2024 rather than 2023. This reduces estimated cumulative gas displacement through 2025 from 18.53 to 17.73 TWh. The full-year operating rate remains unchanged.[10]
Latest 12 months: July 2025–June 2026 sales = 159,500 (H2 2025) + 194,500 (H1 2026) = 354,000.[11] Applying the 2025 retrofit share, 58% gas replacement and 17.32 MWh/unit gives 2.98 TWh/year. This window overlaps 2025, so it is not added to the 2021–2025 total. BWP's 272,026 funding approvals through August 2026 are excluded because approvals are not sales or installations.[12]
2025 consumption comparisons (BWP assumption): The Bundestag reports 261 TWh for households and 112 TWh for commerce and services, totalling 373 TWh.[13] The estimated 8.59 TWh/year of gas displacement equals 2.30% of this figure, 0.99% of Germany's total gas consumption (864 TWh) and 2.97% of reported working-gas storage capacity (289 TWh, including Austrian facilities). These are comparisons of scale, not actual storage reductions. A separate Working Group on Energy Balances (AGEB)-based calculation using unrounded 2024 end-use shares estimates 372.69 TWh Hs for heating and hot water, distinct from the Bundestag's all-use figure.[14]
Wholesale value: Applying annual wholesale prices to estimated cumulative gas displacement gives approximately €0.80 billion through 2025 using the BWP assumption. This is not a household-bill or net economic-savings estimate.
Price inputs (€/MWh): 2021: 46.78; 2022: 124.98; 2023: 40.88; 2024: 34.64; 2025: approximately 37.20. The 2022–2024 values are annual EGSI averages reported by the German Federal Network Agency. The 2021 value is calculated by combining NCG and GASPOOL prices for January–September with THE prices for October–December, weighted by calendar days. The 2025 value is based on FfE's THE day-ahead price estimate.[15]

4. Accelerated scenario to 2035

Accelerated case: One million heating heat-pump sales each year from 2027 through 2035. Scenario, not forecast.
Eligible replacements: Subtract heat pumps for new buildings and replacements of existing heat pumps from annual sales before allocating the remaining units among previous heating systems.
New-build installations: New-build installations are estimated at approximately 51,700 in 2027, rising to around 59,700 annually from 2032. Estimates are based on ifo/EUROCONSTRUCT's July 2026 housing-completion forecasts through 2028, with conservative assumptions thereafter.[16] Heat-pump replacements are modelled using Weibull lifetime distributions reported by the German Environment Agency (UBA), increasing from around 32,500 in 2027 to 139,900 in 2035. These replacement estimates have not been independently validated against observed national installations.[17]

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[10] BWP (2025). Branchenstudie 2025, pp. 4 and 7, section 3.1.

[11] BDH (2025). Heizungsmarkt weiter im Rückwärtsgang; BDH (2026). Heizungsmarkt legt zu: Wärmepumpen setzen positive Impulse.

[12] BWP (2026). Fördermonitor: Mehr als 272.000 Wärmepumpen-Zusagen bis August.

[13] Deutscher Bundestag (2026). Drucksache 21/5159; Bundesnetzagentur (2026). Rückblick: Gasversorgung im Jahr 2025; Bundesnetzagentur and Bundeskartellamt (2025). Monitoringbericht Energie 2025, p. 38, section 6 and footnote 18.

[14] AG Energiebilanzen (2026). Auswertungstabellen zur Energiebilanz 1990–2025, pp. 66–67, tables 6.3–6.4; AG Energiebilanzen (2026). Anwendungsbilanzen 2024, pp. 10 and 14, Tables 2.1 and 3.1; AG Energiebilanzen (n.d.). Definitionen und Methodik (Accessed 30 October 2026).

[15] Bundesnetzagentur and Bundeskartellamt (2023). Monitoringbericht 2023, p. 47; Bundesnetzagentur and Bundeskartellamt (2024). Monitoringbericht 2024, p. 46; Bundesnetzagentur and Bundeskartellamt (2025). Monitoringbericht 2025, p. 42; EEX (n.d.). European Gas Spot Index (EGSI): Indices overview (Accessed 30 October 2026); FfE (2026). Deutsche Strompreise an der Börse EPEX Spot im Jahr 2025, section "Verschiebung zentraler Preistreiber setzt sich fort".

Fuel allocation: After excluding new builds and existing-heat-pump replacements, 1% of eligible units are assigned to other non-heat-pump systems. The remainder is split between gas and oil using Forsa's 58:32 ratio, adjusted as gas/oil building stocks decline. Starting January 2027 stocks are modelled at 10.25 million gas-heated and 4.58 million oil-heated residential buildings, based on 2022 Census stocks carried forward.[18] The bridge uses Destatis's 6,200 completed gas-heated buildings in 2025 as a provisional 2026 addition; other exits (e.g., district heating and demolition) are not separately modelled.[19] The German Federal Association of Chimney Sweeps (ZIV) counts appliances, not buildings. Forsa's 10% 'other' includes previous heat pumps, so the residual 1% is a model assumption, not a survey share.[20]
Resulting gas share of eligible conversions: about 63.8% in 2027 and 67.0% in 2035.
Accelerated result: 88.25 TWh/year of additional direct gas displacement by 2035 and 403.13 TWh cumulatively in 2027–2035, using mid-year commissioning.
2025 scale comparison: The 88.25 TWh/year result equals 10.2% of total German 2025 gas consumption, 23.7% of the published 373 TWh household-plus-GHD all-uses total, or 30.5% of working-gas storage capacity. These are equivalents against the 2025 system, not 2035 forecasts or reductions in storage needs.

4a. BWP business-as-usual (BAU) outlook

BWP BAU input: Annual heating heat-pump sales: 2027 369,500; 2028 408,000; 2029 460,000; 2030 480,500; 2031 533,000; 2032 596,500; 2033 643,500; 2034 675,500; 2035 716,000. Total 2027–2035: 4.8825 million. Uses BWP scenario 1 (BAU), not scenario 2 (ZIEL).[21]
BWP BAU result: Applying the same allocation, stock-adjustment and UBA lifetime method, with retirements recalculated for BAU sales, gives 41.94 TWh/year in 2035 and 165.65 TWh cumulatively (2027–2035). Gas-replacement share in 2035: 65.0% (BAU), versus 67.0% (accelerated). The BWP BAU pathway predates July 2026 changes to heating subsidies and does not account for their potential effects on future sales.[22]

4b. Direct gas-combustion CO_2 proxy

Direct CO_2 factor: UBA natural-gas combustion: 200.99 g CO_2/kWh Hi. With AGEB Hi/Hs ratio 0.90238, this equals 181.37 g CO_2/kWh Hs = 0.18137 Mt CO_2/TWh Hs. Excludes electricity, upstream methane, refrigerants and lifecycle emissions.[23]
Avoided direct gas-boiler CO_2: 2021–2025 sales: 1.56–1.99 Mt/year or 3.22–4.11 Mt cumulatively through 2025. By 2035: accelerated 16.01–20.45 Mt/year (73.12–93.40 Mt cumulative 2027–2035); BWP BAU 7.61–9.72 Mt/year (30.04–38.38 Mt cumulative). Ranges reflect the BWP and Fraunhofer heat-demand assumptions. They do not represent net greenhouse-gas savings.
Boundary: Emissions are derived from displaced gas combustion only. The model does not estimate heat-pump electricity demand, power-sector gas use or power-generation emissions.

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[16] ifo Institut (2026). Wohnungsbau in Deutschland erneut rückläufig, 23 July 2026.
[17] Umweltbundesamt (2025). Wissenschaftliche Analysen zu ausgewählten Aspekten der Statistik erneuerbarer Energien: Fachbericht Wärmepumpen (Climate Change 59/2025), p. 62, Table 1.
[18] Statistische Ämter des Bundes und der Länder (2024). Zensus 2022: Gebäude – Energieträger der Heizung (Accessed 30 October 2026).
[19] Destatis (2026). Baufertigstellungen neuer Gebäude, GENESIS table 31121-0005 (Accessed 30 October 2026).
[20] ZIV (2026). Erhebungen des Schornsteinfegerhandwerks 2025, pp. 4–5, sections 2.1 and 3.1.
[21] BWP (2026). Branchenstudie 2026, p. 24, Table 5.
[22] BWP (2026). BEG: Neue Förderkonditionen ab 21. Juli stehen fest, 17 July 2026.
[23] Umweltbundesamt (2022). CO_2-Emissionsfaktoren für fossile Brennstoffe: Aktualisierung 2022 (Climate Change 28/2022), p. 49, Table 22; AG Energiebilanzen (n.d.). Definitionen und Methodik (Accessed 30 October 2026).

5. Limitations

Observed inputs: Heat-pump sales do not confirm when units were installed or which system they replaced. The model estimates these using market data, adopter surveys and timing assumptions. Survey shares applied across several years may not reflect each year's actual replacements.
Heat demand: Actual gas displacement varies with building size, insulation, weather, hot-water needs and boiler efficiency. The BWP and Fraunhofer estimates use different reference heat demands. Their range is not a statistical confidence interval.
Future pathways: Results for 2035 depend on future sales, new construction, heat-pump retirements and the heating systems replaced. Policy and market changes may affect these assumptions, so the estimates are conditional scenarios rather than forecasts of realised savings.
System boundary: Results cover gas combustion avoided in buildings, not equivalent reductions in national gas imports, storage requirements or total gas consumption. Avoided CO_2 excludes electricity generation, upstream methane and refrigerants.
Value and units: The wholesale value of displaced gas is not household bill savings, which also depend on electricity costs and retail tariffs. Gas volume conversions depend on gas composition. Energy results are reported in TWh Hs.[24]

[24] LBEG (2025). Untertage-Erdgasspeicherung in Deutschland (EEK, 11/2025), p. 29, section “Erdgas als Primärenergieträger”.

Impressum

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