18-PART SERIES
HEAT PUMPS: YOUR BURNING QUESTIONS, ANSWERED NOW

## 1/18
# Beyond the Noise: What the Heat Pump Truly Means for Our Society

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In the history of mankind, probably no heating technology has been discussed as intensely as the heat pump is now. The debate has taken on enormous proportions, especially in Germany[1]. The situation is not much different in a number of other countries. The discussion has long left the technical context and become highly polarised and politicised. But why?

*In Germany the debate has taken on enormous proportions.*

The heat pump itself is a neutral technology that can make our homes warm (and cold). Admittedly, it can also do things that are rarely discussed: making our laundry drying more efficient[2], allowing electric cars to drive further [3], making industrial processes more efficient and cost-effective [4], or supplying entire districts with heat [5]. This list is not exhaustive.

The heat pump performs its services primarily with the help of electricity. This brings us directly to the point of why the heat pump is discussed so much. It embodies one of two visions for how the necessary restructuring of the energy system, the "Energy Transition" (Energiewende) (and thus the Heat Transition), can look.

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### Why is the Energy Transition Necessary?

Today's energy supply is mostly based on fossil fuels. This must change for at least three major reasons. The most important, in the long term, is the reduction of CO2 emissions and thus the limitation of the global temperature increase[6]. The evidence for these connections is scientifically undisputed [789]. The same applies to the consequences we face if we do not act immediately in the short term [101112]. Anyone who still claims otherwise does so out of deliberate ignorance or calculation.

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The second reason is economics. Apart from the ecological impact, the use of renewable energy sources is simply more cost-effective[131415]. Furthermore, the price stability of fossil fuels is uncertain [16]. Political decisions, natural disasters, or deliberate malicious acts can seriously change prices both locally and globally in a short time. A painful example was the price volatility in the first year of the war in Ukraine[17].

The third reason is geopolitical dependence and the associated risks. Dependence on certain suppliers, insecure supply chains, energy security, and capital outflow are just a few examples.

**Which Technologies Drive the Energy Transition Forward?**

Simply put, there are two ways to achieve the energy transition: "The Path of Electrons" and the associated electrification of the energy system, and "The Path of Molecules," or "Power-to-X," which involves the increased use of synthetic fuels. Both paths have their justification, advantages, and disadvantages. Unfortunately, they are often presented as alternatives instead of evaluating the approaches for specific areas individually.

*There are two ways to achieve the energy transition: "The Path of Electrons" and "The Path of Molecules".*

In the heating sector, the better solution, and thus the decision, seems obvious. The Path of Electrons replaces fossil heating systems in buildings with heat pumps. There is also a Path of Synthetic Fuels which envisions burning hydrogen for heat supply with a tempting promise that we do not have to exert ourselves now, and in the future, decarbonisation will occur "almost by itself" by simply burning "green hydrogen" instead of fossil gas. Numerous studies describe that this is not "simple" and, above all, not cost-effective. The well-known Oxford researcher Professor Jan Rosenow summarized 54 independent studies[18]. The result could not be clearer: None of the studies identifies heating with hydrogen as the preferred solution, as it is both less efficient and more expensive than the heat pump. The latest study by the Fraunhofer Institutes IEG and ISI[19] once again sees no future for hydrogen in heating.

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**The Debate**

Beyond all the myths about alleged technical weaknesses, the heat pump debate is a political confrontation. It is not really about the technology itself, but about a political vision for the energy transition. Put sharply, it is an attempt to enable the continued use of fossil fuels regardless of the associated consequences.

We should not use heat pumps because some politicians are pushing their use or others are calling them "green folly." We should use this technology because it is the best, fastest, and most cost-effective solution for a successful energy transition. Undoubtedly, this solution also presents certain challenges, but the alternatives are simply not better.

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**The Series**

With this contribution, we launch our 18-part series, "Heat Pumps: Your Burning Questions Answered Now" – a fact-check that objectively assesses common arguments from the debate.

Based on expertise gained from more than 20 years of heat pump experience, our goal is to replace speculation with facts.

We translate complex research into clear answers on all topics – from existing buildings to AI integration. This creates a solid, independent foundation to ensure decision-making certainty for end-users and actively drive the Heat Transition forward.

Next week, we will present the most important findings from the heat pump field studies of the last 20 years. Subsequent episodes are expected every Tuesday.

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[1] RedaktionsNetzwerk Deutschland (RND) (2023): Streit um das Heizungsgesetz: Chronologie eines Debakels. [online] Verfügbar unter: https://www.rnd.de/wirtschaft/streit-um-das-heizungsgesetz-chronologie-eines-debakes-SZJ6R6A2UZGCJNZMC325MF446M.html [Zugriff: 25.10.2025].
[2] wissenschaft.de (2019): Wärmepumpentrockner – Energieeffizienz und Einsparpotenzial. [online] Verfügbar unter: https://www.wissenschaft.de/technik-digitales/waermepumpentrockner-energieeffizienz-und-einsparpotenzial/
[3] the windscreen (2025): Elektroauto & Wärmepumpe: Reichweitenoptimierung für E-Mobilität. [online] Verfügbar unter: https://thewindscreen.com/markt/elektroauto-waermepumpe-reichweitenoptimierung-fuer-e-mobilitaet/
[4] Arpagaus, Cordin (2019): Hochtemperatur-Wärmepumpen. Marktübersicht, Stand der Technik und Anwendungspotenziale. VDE Verlag, Berlin. ISBN 978-3-8007-4550-0.
[5] Projektträges Jülich (2024): Reallabor der Energiewende GWP Großwärmepumpen in deutschen Fernwärmenetzen. [online] Verfügbar unter: https://www.energieforschung.de/projekt/neu-grosswaermepumpen-in-deutschen-fernwaermenetzen/
[6] IPCC, 2023: Sections. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647
[7] J. Jouzel et al. Orbital and Millennial Antarctic Climate Variability over the Past 800,000 Years. Science 317,793-796(2007). DOI:10.1126/science.1141038 // Morice, C. P., Kennedy, J. J., Rayner, N. A., Winn, J. P., Hogan, E., Killick, R. E., et al. (2021). An updated assessment of near-surface temperature change from 1850: the HadCRUT5 data set. Journal of Geophysical Research: Atmospheres, 126, e2019JD032361. https://doi.org/10.1029/2019JD032361
[8] Sachverständigenrat für Umweltfragen (SRU) (2024): Wo stehen wir beim $CO_2$-Budget? Eine Aktualisierung. Kurzpapier. [online] Berlin. Verfügbar unter: https://www.umweltrat.de/SharedDocs/Downloads/DE/04_Stellungnahmen/2020_2024/2024_03_CO2_Budget.pdf
[9] Urban, M. C. (2024): 'Climate change extinctions', Science, 386 (6727), S. eadp4461. DOI: 10.1126/science.adp4461.
[10] Patrick Jürgens, Markus Kaiser, Charlotte Senkpiel, Connor Thelen, Christoph Kost & Hans-Martin Henning (05 Jun 2025): Closing the ambition gap: Germany's energy transition in line with a 1.5°C carbon budget, Climate Policy, DOI: 10.1080/14693062.2025.2506610
[11] Armstrong McKay, D. I. et al. (2022): 'Exceeding 1.5°C global warming could trigger multiple climate tipping points', Science, 377 (6611), S. eabn7950. DOI: 10.1126/science.abn7950.
[12] Katherine Richardson et al., Earth beyond six of nine planetary boundaries. Science Advances. 9, eadh2458 (2023). DOI:10.1126/sciadv.adh2458
[13] Pietzcker, R. et al. (2025): Die Energiewende kosteneffizient gestalten: Szenarien zur Klimaneutralität 2045. Kopernikus-Projekt Ariadne Report, Potsdam. DOI: 10.48485/pik.2025.003. [online] Verfügbar unter: https://ariadneprojekt.de/media/2025/03/Ariadne-Report_Szenarien2025_Maerz2025_lowres.pdf
[14] Luderer, Gunnar, et al. "Impact of declining renewable energy costs on electrification in low-emission scenarios." Nature Energy 7.1 (2022): 32-42.
[15] Osman, Ahmed I., et al. "Cost, environmental impact, and resilience of renewable energy under a changing climate: a review." Environmental chemistry letters 21.2 (2023): 741-764.
[16] BloombergNEF. (2025, 15. April). New Energy Outlook 2025. https://about.bnef.com/insights/clean-energy/new-energy-outlook/
[17] ZEIT ONLINE (2025): Energiemonitor. [online] Hamburg. Verfügbar unter: https://www.zeit.de/wirtschaft/energiemonitor-strompreis-gaspreis-erneuerbare-energien-ausbau
[18] Rosenow, Jan, "A meta-review of 54 studies on hydrogen heating", Cell Reports Sustainability, Volume 1, Issue 1, 100010
[19] Fraunhofer IEG und ISI (2025): Heizen mit Wasserstoff – Aufwand und Kosten für Haushalte anhand aktueller Daten und Prognosen. Im Auftrag von Greenpeace e.V. und Gaswende. Verfügbar unter: https://www.greenpeace.de/publikationen/251014_Studie_Heizen_mit_Wasserstoff_20251013.pdf