From Logistics Asset to Infrastructure Hub

THE FUTURE OF LOGISTICS REAL ESTATE.

GARBE.
Industrial Real Estate

Under a Visionary Approach, Infrastructure Real Estate could Secure Supply Chains and the Energy Supply.

The recent pandemic and the war in Ukraine demonstrated how fragile both our supply chains and our energy supply are. The supply chain issues were addressed by stepped-up warehousing as well as via re- and near-shoring strategies. This in turn raised the pressure on the market for sites and plots of land, which are scarce anyway. The job of the energy policy was to reduce dependence on Russian gas and oil as quickly as possible. As a short-term solution, Germany principally met this objective by constructing LNG terminals on its seaboard. It is, of course, not the same as a sustainable solution. It will not help the effort to reach the goal of sourcing the country's energy solely from renewables by 2035. Logistics and industrial properties with their vast roof surfaces, however, could provide considerable leverage in the production of solar power. But instead of tapping this potential in pragmatic and purposeful ways, such ambitions continue to be hampered by red tape and regulatory constraints. And this even though the ESG strategy of the real estate industry demonstrates that it is highly motivated to play its part in the implementation of the energy policy shift.

We are currently seeing multi-layered ramifications of crises and mega trends. There is growing evidence that we will not be returning to calmer waters any time soon. On the contrary: It will take us a good long while yet to cope with the polycrisis on our hands. We at GARBE Industrial Real Estate, though, strive to take a forward-looking approach and to be part of the solution. That is why we have been looking into the next step in the evolution of logistics real estate: the infrastructure hub.

Aside from its distribution role, tomorrow's distribution centre will double as a small-scale power plant, thanks for photovoltaics and wind power. The energy produced here will be consumed not just on site, e. g. by the electric vehicle fleet inside the warehouse or by local and long-haul transportation, but will also be used by electrolysers in hydrogen production. Excess power will be stored in batteries, and can thus be used to stabilise the base load of electricity grids whenever sunshine or wind are temporarily unavailable.

The same effort is aiding the digitisation drive because data centres have similar locational requirements as logistics warehouses, and thus represent a great add-on. They will readily consume the energy produced on site. Another aspect of digitisation is mobile communications, which is crucial for autonomous vehicle fleets, for instance. Accordingly, cell towers will be an integral part of this concept.

Electrolysers and data centres both generate waste heat, which in turn could be used to supply the surrounding area by being integrated into a municipal local heat network. The energy transition, the heating transition, the digital transformation and many other things could be seriously boosted by such an infrastructure hub. They are sure to make a difference not individually but at scale, meaning through the collective effect of many decentralised hubs. Moreover, combining the various single features will help to slow the unchecked expansion of the urban sprawl. All things considered, it is a win-win-win situation for all stakeholders involved.

LOGISTICS REAL ESTATE SPELLS VERSATILITY.

The Genesis of Tomorrow's Infrastructure Property

Distribution

A constant now as then – space requirements are expected to increase

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Photovoltaics

Roof surfaces show great potential, and so will façades soon

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Local heat

Using waste heat from electrolysis and data centres to supply local consumers

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Wind power

Tall long façades are potentially suitable for wind roller systems

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Data centres

Integration made possible by similar locational requirements

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Battery storage systems

Small power plants and energy storage facilities in a decentralised electricity grid

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Mobile/broadband communications

Cell towers as a key part of broadband expansion

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Hydrogen

Combining energy generation with hydrogen production for HGV and nearby businesses

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DISTRIBUTION

DOING MORE ON A SMALLER FOOTPRINT.

The pressure is rising: A growing demand for space coincides with shrinking land availability.

For the time being, take-up has levelled out somewhat, reflecting the lingering uncertainty in the market. Other contributing factors include, of course, the sputtering economy or the sluggish demand in the retails sector. Much graver, though, is the supply shortage. In many logistics regions, there is simply no floor space available, and new-build construction volumes have fallen sharply. Since floor space take-up correlates strongly with the trend in gross value added, it is quite evident even now that the logistics real estate segment is developing a supply gap, caused by the sheer volume of demand. This is all the more true because, in addition to the day-to-day business of logistics, trends such as re-globalisation and the palpable dynamics of online retailing will generally drive up demand for space in the years ahead.The situation is exacerbated by the clearly tightening land use policy. The government seeks to drastically reduce soil sealing, with the objective of achieving net zero by 2050. There are sound reasons for wishing to preserve land, a precious resource. But the policy creates a dilemma, and not just for the logistics real estate sector.

Which way forward? Burying your head in the sand is hardly helpful. Rather, it makes sense to take a creative, forward-looking approach and to figure out how the various types of floor space use could be combined. GARBE's vision of infrastructure hubs aims exactly in this direction.

Trend in food online retailing

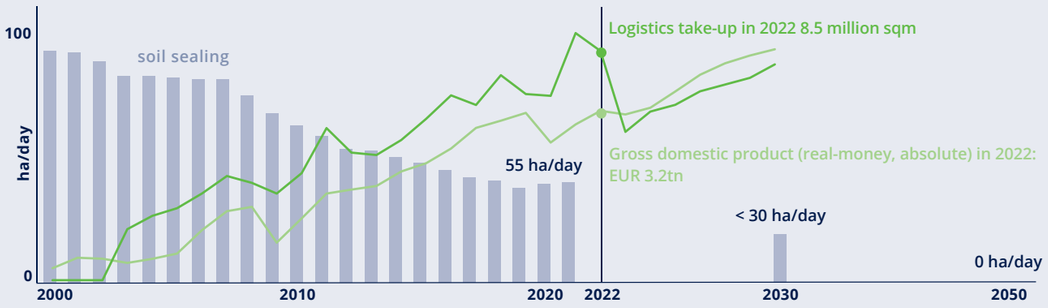
+38 %

growth in freight transport between 2010 and 2030

+17 %

increase in volume of KEP shipments expected by 2027

Trend in soil sealing in Germany



Sources: GARBE Research, based on data from BNP Paribas Real Estate, CBRE, EU Commission, Handelsblatt, IFH Köln, Oxford Economics, German Environment Agency (UBA)

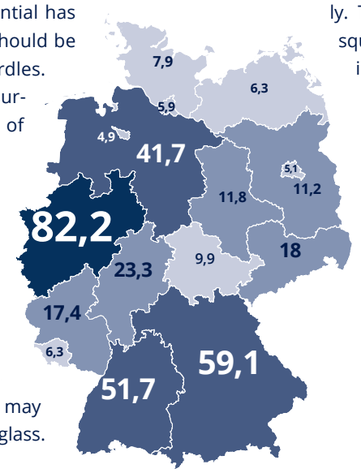
PHOTOVOLTAICS

COVERING THE BUILDING AND THE ELECTRIC BILL.

Roof Surfaces of Logistics Facilities Show Growing Potential for PV Systems

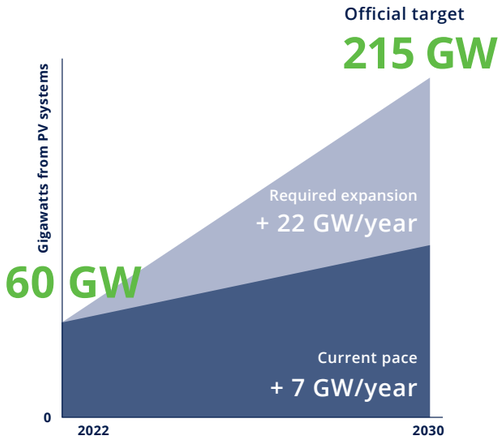
Roof surfaces of logistics and industrial facilities in Germany offer enormous potential for photovoltaics systems. The exploitation of this potential has not yet gathered momentum, which should be blamed not least on bureaucratic hurdles. Moreover, a mere fraction of the roof surfaces was suitable for the installation of PV systems just a few years ago.

But recent structural upgrades and technological innovation have opened up entirely new possibilities. Modern solar cells made of hydrocarbons are flexible, translucent and much lighter than conventional silicon modules. Accordingly, they can be installed not only on any type of roof but may also be mounted onto façades or even glass.



In a few years' time, Germany is supposed by get its electricity solely from renewable energy sources. With this in mind, the Federal Government aims for an installed output of 215 Gigawatts from PV systems by 2030. At the moment, around seven Gigawatts of solar power are coming on-stream annually. In order to achieve the quoted target, the rate of increase would have to triple, up to 22 Gigawatts annually. The enormous potential of 360 million square metres of roof surfaces on top of industrial and logistics buildings could seriously contribute to this effort: In addition to the production of green electricity, making efficient use of the available space is another important aspect of sustainable action.

In 2023, the roof surfaces on top of industrial/logistics properties in Germany added up to 362 million sqm.



The pace of solar power development need to triple

30 m.

square metres of warehouse roof surface completed since 2012 are built to PV specificationst.

800.000

households could be supplied from this power for a year

Sources: GARBE Research, based on data from German Logistics Association, Destatis, Handelsblatt, OpenStreetMap, Statista

WIND POWER

REINVENTING THE WHEEL.

Wind Rollers Optimally Supplement PV Systems on Logistics Properties

So far, separation distance rules, cast shadows and noise emissions have severely hampered the use of rotor-driven wind turbines in the vicinity of logistics properties. But innovative wind roller systems have lately opened up significant potential because these may even be installed horizontally, along roof edges. Logistics facilities with their long and relatively tall façade would easily lend themselves to this purpose. Updrafts generated by the façades will flow through turbines installed at the roof edges, which are set in motion via vertically mounted rotors. When combined with solar modules, this puts almost the entire building surface to use for energy generation purposes. Assuming Germany's electricity consumption climbs to 1,000 Terawatt hours by 2045 as predicted, these resources will be urgently needed in future.

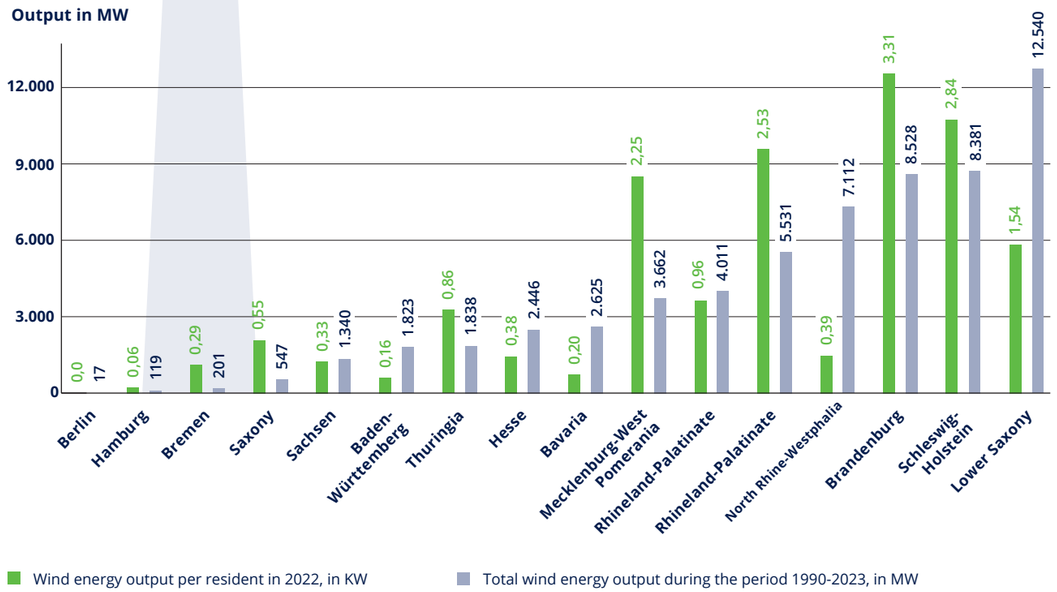
The development of wind energy in Germany shows a distinct north-south gradient. Although the northern states have climatic locational advantages, even densely populated or less windy regions could use wind roller systems to exploit wind energy. With their comparatively modest output, these may not be able to compete with the enormous outdoor wind turbines that generate up to 5 MW. Rather, the benefit of wind rollers is that they make efficient use of already developed land and that they are more likely to be accepted by the general population.

3,9 GW

annually is the development target set by the German government. It equals the output of all wind turbines installed in the state of Rhineland-Palatinate since 1990.

Lower Saxony has the largest wind energy output at 12,540 MW.

Brandenburg generates 3.31 KW/resident of wind power.



Sources: GARBE Research, based on data from Aeromine Technologies, IWR, German Environment Agency (UBA)

BATTERY STORAGE SYSTEMS

DEFYING THE DARK DOLDRUMS.

Battery Storage System as Solution for the Base Load Dilemma of Renewables

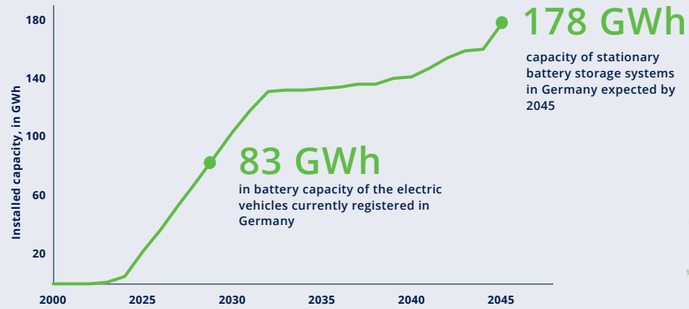
Stationary battery storage systems keep gaining in significance, both in the private and the commercial sector. By 2022, a total of 326,048 battery storage systems had been installed in Germany, more than one third thereof in the time since 2021. Technological progress has led to the development of ever more affordable and more productive solutions for storing the energy generated from sun, wind and water. They help to deflect peak loads and to put privately produced green electricity to more effective use.

Today, wind power and photovoltaics count among the mainstays of Germany's energy supply. Yet the issue of the so-called "dark doldrums" persists, which refers to the fluctuation in electricity yields during sunless, windless times. Lately, battery storage has emerged as a possible answer because, unlike existing pumped storage plants, batteries are flexibly deployable and scalable. Battery storage systems can have capacities of several MWh, and could even sustain systemic services such as the charging infrastructure for electric vehicles. Combined with their wind power and PV systems, logistics facilities offer great potential for meeting the enormous need to expand capacity. Not only do they have the necessary surface areas, they also have the right kind of infrastructure prerequisites in place.

240 m.

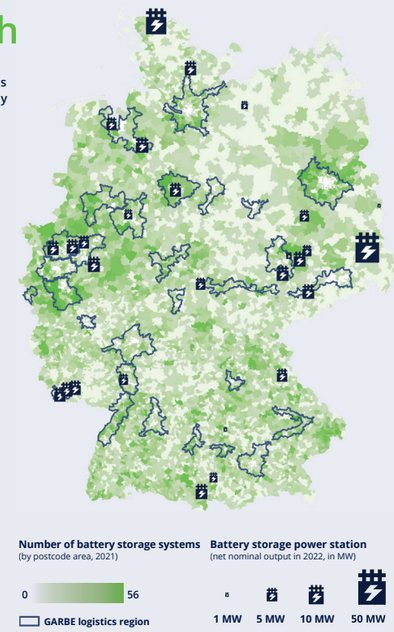
mobile phone batteries or 2.4 GWh of storage capacity were added in the of new battery storage systems were added in the first half of 2023.

Trend in battery storage capacity through 2045



Over the coming two decades, it is planned to increase the battery storage capacity in Germany by more than a hundred times.

Battery storage systems in Germany in 2022



Sources: GARBE Research based on Federal Network Agency, Fraunhofer ISE, RWTH Aachen University

HYDROGEN

TOWARDS A SUSTAINABLE POWER SUPPLY.

Green Hydrogen as Source for a Decentralised Energy Supply

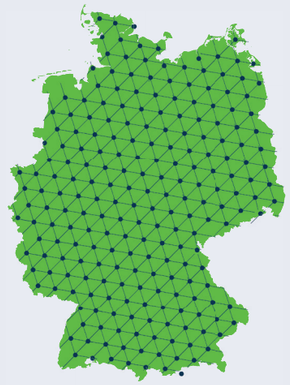
Hydrogen is considered an energy source with a great future. Excess green electricity generated on the rooftops of logistics warehouses could be used to produce it via electrolysis. Thus produced, it represents carbon-neutral "green hydrogen" unlike the hydrogen produced by conventional methods. In the long term, the energy-intensive industrial plants of steel and chemical companies, for instance, will be unable to transition to an environmentally friendly production without hydrogen.

Germany is therefore planning to increase its hydrogen production to 10 GW by 2030. The country's roughly 25,000 logistics sites with their large outside areas and roof surfaces, suitable for PV and wind power systems, could be instrumental in achieving this goal. After all, their energy production tends to exceed local demand. Excess energy could therefore be used to produce green hydrogen remotely at the logistics facilities dispersed all over Germany. This would turn logistics properties into nodal points of the hydrogen economy, as they combine the decentralised production, transportation and consumption of hydrogen in a single place. It is an approach that would significantly contribute to the implementation of the EU's "Green Deal."

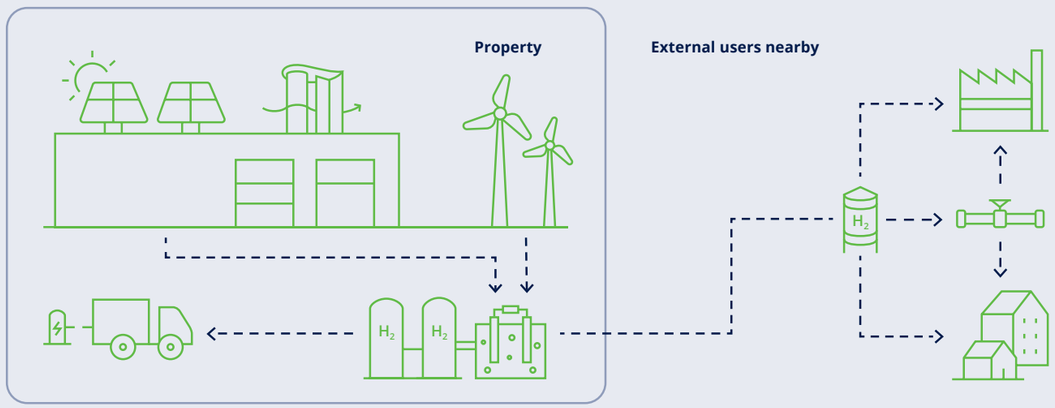
Hydrogen production capacity in Germany

A production capacity of 10 Gigawatts equals the output of 6 to 8 mid-sized nuclear power plants

Model of a decentralised hydrogen network



Sector coupling at a logistics site



Sources: GARBE Research, based on data from the Federal Ministry of Education and Research (BMBF), Deutsche Welle, Handelsblatt

MOBILE/BROADBAND COMMUNICATIONS

ELIMINATING 5G WHITE SPOTS.

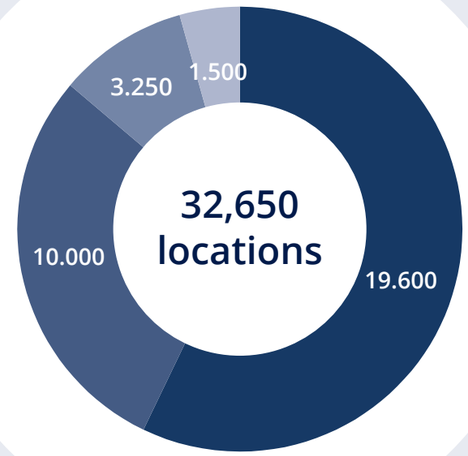
Few Suitable 5G Sites

Germany is still a long way off from providing nationwide 5G coverage. While you will often read about 98% network coverage across Germany, the situation on the ground actually resembles a patchwork. Here is why: The network coverage is determined by combining the wireless communication networks of all providers, which concentrate on the coverage of conurbations above all. Especially out in the countryside, customers rarely have uninterrupted 5G connectivity. However, having a stable 5G network is crucial for many use cases in the business world, including healthcare or automotive.

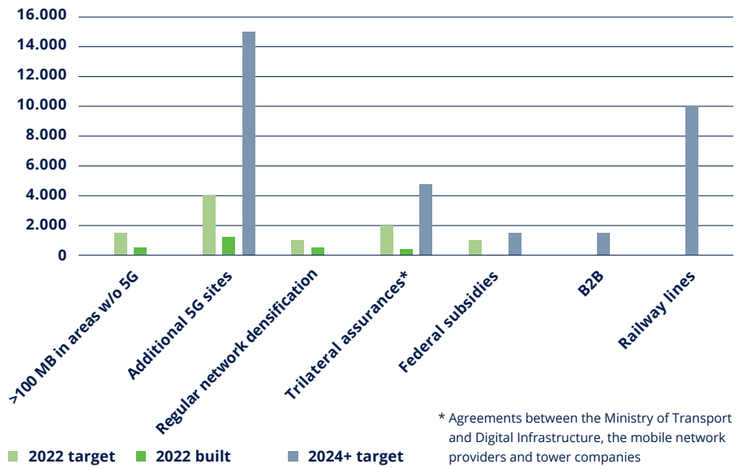
Experts estimate the need for new cell towers to exceed 32,000 sites, most of which are supposed to be roof-mounted. So, finding suitable roof surfaces for their installation is therefore a decisive factor. The search is made all the more difficult at present because precisely the areas that need better 5G coverage often lack sites suitable for cell towers.

The enormous space potential of logistics facilities could provide a viable low-cost solution here, and play a key role in the development of a tightly knit 5G network.

Demand for new 5G sites over the next 3 to 4 years



5G expansion target



* Agreements between the Ministry of Transport and Digital Infrastructure, the mobile network providers and tower companies

98 %

coverage within the 5G network is available only if your mobile phone has SIM cards from all providers.

Sources: GARBE Research, based on data from the Federal Network Agency, HG Consulting, Spiegel

DATA CENTRES

SHARING THE ENERGY USE.

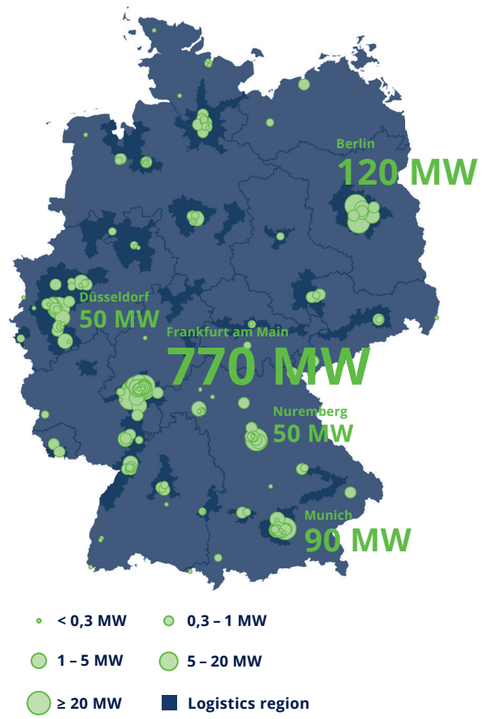
Logistics Facilities and Data Centres Discovering Synergy Potential

Demand for data centres is growing steadily around the globe. The growth is driven by online retailing, streaming services and the trend to work from home. The digital transformation of the economic and administrative worlds, including the application of artificial intelligence, is only just getting started. In order to keep transmission times (latency) and privacy risks to a minimum, there is a growing urgency for more data centres in Germany. The requirements for commercial-zoned land are very similar to those for logistics real estate. Both types of property form similar clusters, and thus have certain challenges in common. Especially land and power capacities tend to be in short supply for either type of real estate. Why not combine the two uses and reduce soil sealing at the same time? Solar and wind energy produced on top of logistics properties could be fed directly to nearby data centres. Inversely, the exhaust air emitted by the latter could be exported to logistics properties and third-party users nearby.

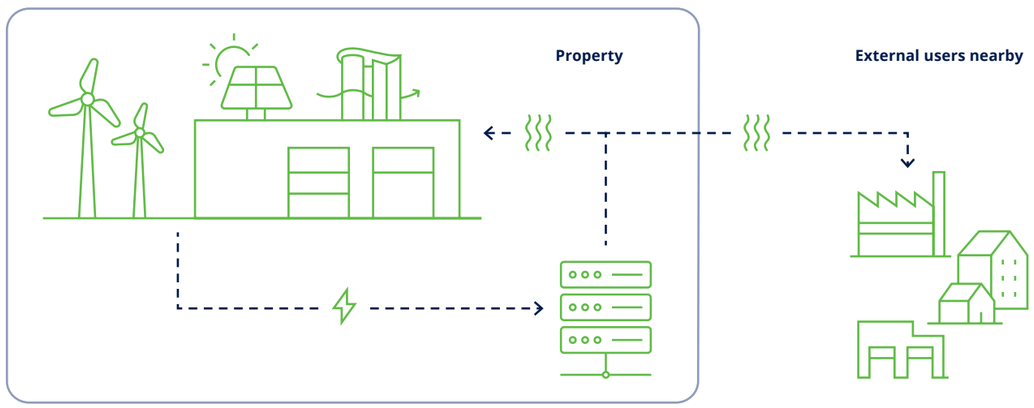
1,08 GW

is the total output of data centres in the major logistics regions

Data centre output by logistics region



Energy and heat generation at a logistics site



Sources: GARBE Research, based on data from the German Datacenter Association

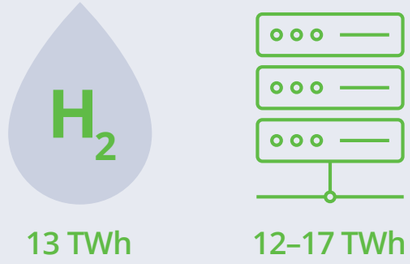
LOCAL HEAT

HELPING TO SHAPE THE HEATING TRANSITION.

Local Heat from Data Centres and Electrolysers as an Efficient Energy Source

Many buildings in business locations produce thermal energy as a waste product of sorts. Putting it to good use would be an alternative to gas heating that is both climate compatible and cheap, and this could make local heat concepts an attractive proposition. Aside from the waste heat of data centres, the electrolysers used in hydrogen production offer possibilities just as interesting. These split water into its components of hydrogen and oxygen using electricity from renewable energies, a process that also generates waste heat. When set up next to logistics facilities, their waste heat could be passed on directly to private households and commercial businesses in the area.

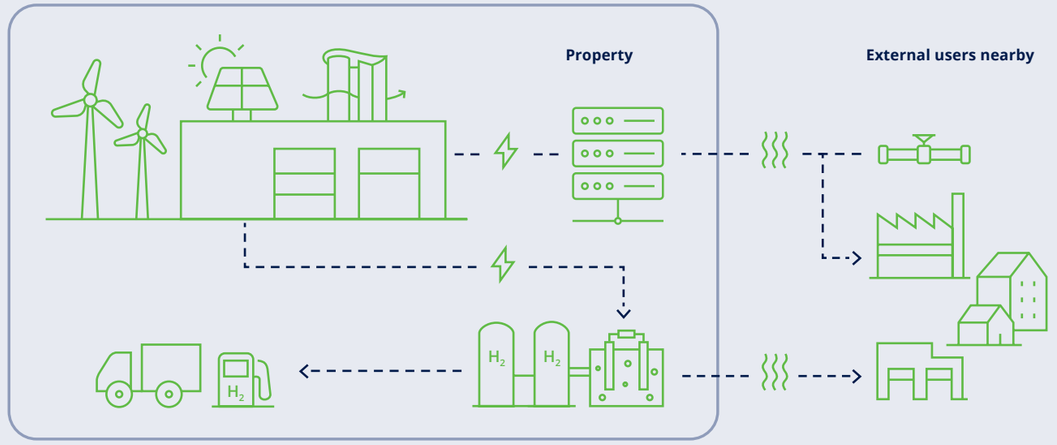
Waste heat from electrolysis and data centres in 2030*



4x

server processors emit roughly four times as much heat as a conventional electric hob.

Local heat from data centres and electrolysers at a logistics site



Sources: GARBE Research, based on data from cloud&heat, DatacenterDynamics, FH Westküste

* Forecast, assuming the same or a slightly improved level of efficiency

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