



# FEASIBILITY STUDY FOR THE KLIMAWERKSTATT@BERLIN

A centre of excellence for the air-conditioning trade  
to recruit young talent, promote innovation and  
provide training and further education

**Executive Summary**  
(software translation of German version)

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## Acknowledgement

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## Summary

The German Confederation of Skilled Crafts (ZDH) estimates that up to 250,000 positions in the skilled crafts sector are currently unfilled<sup>1</sup>. This staff shortage threatens to worsen in the coming years: According to the Kiel Institute for the World Economy (IfW), the peak in employment is likely to be reached in 2023 with just under 46 million people in work, after which more people will probably leave the labour force than enter it<sup>2</sup>.

The lack of staff is hampering economic growth and also jeopardising the implementation of political goals such as the energy transition, for the success of which craftsmen and women have to carry out energy renovations, install solar systems, storage tanks and heat pumps, or electrify transport. In the current coalition agreement, Berlin has set itself the goal of becoming climate-neutral by 2045 at the latest. To achieve this, the total amount of CO<sub>2</sub> emissions is to be reduced by at least 95 percent by 2045 compared to the total amount of carbon dioxide emissions in 1990.

One of the most important questions that arises in connection with these expansion goals is the question of qualified personnel who will install this building technology in interdisciplinary cooperation and at the appropriate speed and quality for a climate-neutral Berlin. The *Solarcity Master Plan*, which promotes the expansion of solar energy under the auspices of the Senate Department for Economic Affairs, Energy and Enterprises (SenWiEnBe), addresses this issue. Specifically on the situation in the skilled trades, the monitoring report of the *Solarcity Master Plan* for 2021 stated that "above all, the shortage of skilled workers due to a lack of young talent in the skilled trades sector [...] must be countered as quickly as possible" and that the "Berlin skilled trades play a key role in achieving the expansion targets of the *Solarcity Master Plan* [...] and should therefore be sustainably strengthened in terms of their personnel capacities."<sup>3</sup>

As early as April 2021, the Berlin Guilds for Electrical Engineering and for Sanitation, Heating, Plumbing, Air Conditioning (SHK Berlin) presented the idea of a *KlimaWerkstatt@Berlin (KW@B)* as a solution module for recruiting and securing skilled workers in Berlin as part of a specialist workshop of the master plan on the topic of skilled crafts: The new construction and operation of a cross-trade exhibition and education centre for the purpose of demonstration, education and training in climate-friendly building energy technology for Berlin's skilled trades, to be built on a still undeveloped plot of land belonging to the Electrical Guild in Berlin. The closer examination of the feasibility of such an education centre on this site was welcomed by the participants of the workshop as well as by SenWiEnBe.

Together with the Berlin institute ideas into energy, the two guilds then developed a concept for this feasibility study with the aim of finding out what content and formats such a climate workshop would have to offer in order to make an effective contribution to the recruitment of skilled workers and to the cross-trade qualification of skilled workers for the Berlin skilled trades and thus also to specifically support the

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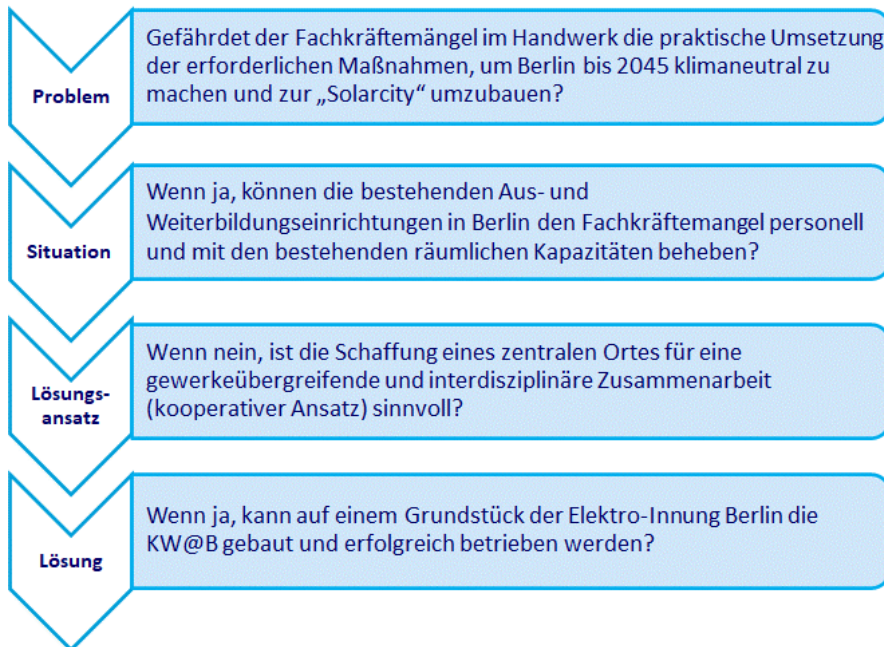
<sup>1</sup>ZDF (2022), <https://www.zdf.de/nachrichten/panorama/handwerk-mitarbeiter-fachkraefte-personalmangel-100.html#:~:text=According%20to%20the%20industry%20association%20there%20are%20sch%3A4tzungsweise%20250.000%20stellen%20unbesetzt.&text=The%20trade%20businesses%20in%20Germany%20are%20searching,curently%20150.000%20open%20jobs%20reported>.

<sup>2</sup> Tagesschau (2022), <https://www.tagesschau.de/inland/rentner-deutschland-101.html>

<sup>3</sup> Solarcity Master Plan, Monitoring Report (2021), [https://www.berlin.de/sen/energie/energiepolitik/masterplan-solarcity/20220217\\_masterplan\\_solarcity\\_2021\\_monitoringbericht\\_satz.pdf](https://www.berlin.de/sen/energie/energiepolitik/masterplan-solarcity/20220217_masterplan_solarcity_2021_monitoringbericht_satz.pdf)

expansion of climate protection in Berlin. Four central questions were defined as theses, which build on each other and must first be confirmed or rejected, and if the theses are confirmed, they must be detailed, supplemented, analysed, documented and, where possible, quantified or budgeted:

**Figure 1: Central questions of the feasibility study**



**Source: ideas into energy, Elektro-Innung Berlin, SHK-Innung Berlin, 2022**

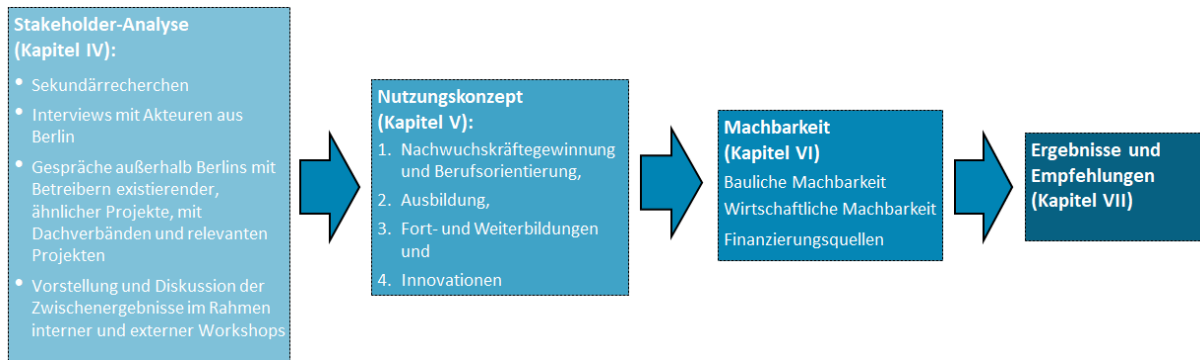
In this study, the first thesis, the challenge of the shortage of skilled workers and its development in Germany and Berlin, was examined in more detail, see Chapter II. In order to verify the question, it was also shown whether and to what extent the future decline in the labour force, especially those in the skilled trades, can be partially compensated for by new technologies such as artificial intelligence, robotics or increasing digitalisation - with the result that the occupational segments of construction and finishing occupations are the least likely to be replaced by computers and artificial intelligence after medical and social occupations, and that in the course of this, however, the occupations that will be eliminated in other sectors of the economy, for example in the manufacturing industry, represent a possible opportunity for strengthening the skilled labour base in the skilled trades.

In order to evaluate the shortage of skilled workers in the skilled trades with regard to its effect on climate protection, the photovoltaic (PV) installations required by 2035 were subjected to a comparative analysis with regard to the number of skilled workers needed in Berlin to upgrade the buildings and infrastructure towards climate neutrality according to the expansion paths adopted by the Berlin Senate. The Berlin Senate envisages an expansion of PV to a total of 4,400 MW of installed capacity in the city by 2035. If we compare the planned expansion figures for 2021 of around 350 MW required for this according to our own calculations with the actual cumulative installed capacity in the city area of around 157 MW by the end of 2021, then a clear deviation between installed target and actual capacity is already apparent here at the beginning of the expansion path until 2035. The reasons for the deviation are manifold, but various studies indicate that a more accelerated market expansion of PV in Berlin is prevented primarily by the lack of additional capacities of planners and craftsmen. According to the estimates in this study, the number of full-time positions required to install PV in order to reach this 4,400 MW in 2035 must increase from

around 500 today to almost 3,000 by then, a six-fold increase. A similarly large increase in full-time positions, namely an estimated 2,700 additional installers, will be needed for the expansion of another key technology, the heat pump, in Berlin. In comparison, employment figures in the electrical and HVAC trades have stagnated in recent years, so that there is indeed a large gap between aspiration and reality with regard to the required skilled labour base in Berlin's air conditioning trade.

Based on the verification of the initial question of an acute shortage of skilled workers in the skilled crafts sector, the further theses were worked through in this feasibility study with the following structure. This structure is explained in more detail in Chapter III:

**Figure 2: Structure of the feasibility study**



**Source: ideas into energy, Elektro-Innung Berlin, SHK-Innung Berlin, 2022**

A stakeholder analysis, based on extensive secondary source research as well as numerous interviews with Berlin stakeholders and contacts outside of Berlin, prepared in Chapter IV of this study, forms the natural basis for all further chapters.

In Chapter V with the utilisation concept, the four fields of action identified for this purpose are described in detail on the basis of the interviews, workshops and secondary research in order to work through the second and third central questions of the study:

**Figure 3: The four fields of action of KW@B**



**Source: ideas into energy, Elektro-Innung Berlin, SHK-Innung Berlin, 2022**

These four fields of action are to be combined in one building in order to realise synergies. What all fields of action have in common is that they are to be structured in a cross-trade, communicative, practice-oriented and modular way and can thus make an important contribution to creating more craft capacity by

- both more people take up a career in the skilled crafts and the compatibility of these people with the requirements of different trades can be clarified as early as possible.
- climate-relevant aspects can be vividly demonstrated and taught during training, so that the motivation of junior staff for sustainability topics and climate technologies is promoted at an early stage, trainees can increase their confidence in dealing with climate technologies through practical exercises, so that they can successfully complete their training.
- experienced craftsmen but also teachers from vocational schools can complete climate-relevant further and advanced training courses, which are intended to further promote the level of competence of the employees and to enhance the crafts sector's external image and make it more attractive.
- a contribution is made to ensuring that innovations find their way into practice at an early stage and ensure that the installation of air-conditioning technologies can be carried out more quickly and in a less labour-intensive manner, so that the physical strain of manual work can also be reduced, thus increasing the attractiveness of the profession.

The following key topics were defined by the author team for the four fields of action in the course of the stakeholder discussions:

**Table 1: Focus topics of the four fields of action of KW@B**

Recruiting young talent	Training	Further education	Innovation
<ul style="list-style-type: none"> <li>• General career orientation, focus on university graduates</li> <li>• Recruitment of junior staff Pupils:inside</li> <li>• Recruitment of junior staff Career changers</li> <li>• Recruitment of young women</li> </ul>	<ul style="list-style-type: none"> <li>• inter-company apprenticeship training units (ÜLUs) not yet offered in Berlin but already in existence ("missing ÜLUs"),</li> <li>• ÜLUs that are offered but for which there could be bottlenecks in existing training facilities in the future as demand grows ("bottleneck ÜLUs"),</li> <li>• Cross-trade climate change OUs ("C OUs") that do not yet exist but can be expected in the future.)</li> <li>• Exam preparation and final exams for associates</li> </ul>	<p>Focus on energy transition technologies:</p> <ul style="list-style-type: none"> <li>• PV,</li> <li>• Heat pump,</li> <li>• Smart Home &amp; Charging Infrastructure</li> </ul> <p>In addition: Innovative products and methods</p> <ul style="list-style-type: none"> <li>• Trainings</li> <li>• Master craftsman training</li> <li>• Academic further education</li> <li>• Bachelor and Master Professional</li> <li>• Product-independent courses and training</li> <li>• Preparatory courses for obtaining a certificate of competence, the so-called technical rules (TR)</li> <li>• Product training</li> <li>• Offers for teachers ("Train-the-Trainer")</li> </ul>	<p>No research, but presentation and practical tests of technical innovations and their possible applications with relevance for the air-conditioning trade.</p> <ul style="list-style-type: none"> <li>• Process innovations</li> <li>• Product innovations</li> </ul>

Source: ideas into energy, Elektro-Innung Berlin, SHK-Innung Berlin, 2022

With regard to the third thesis, the creation of a central place to house these fields of action in a single location in Berlin, the study found that even in times of increasing home office activities and the growth of digital training and further education offers, such a physical location is indispensable, because especially in the skilled crafts sector, the focus is on teaching practical skills. In order to build up or deepen these skills, there is a need for appropriate "workshops" where lectures can and should be given, but the focus is on practical exercises. In addition, the accommodation of the *KW@B* in a building with lighthouse character should help to inspire more young people for the climate craft, in which didactic preparation is used to show what climate change means and, using the latest technology, which job profiles and opportunities the climate craft offers in this area. The construction of such a climate workshop as an independent building can therefore represent added value in itself.

As part of this study, a site owned by the Berlin Electrical Guild was examined in more detail and a construction feasibility analysis was then carried out in Chapter VI. The site has an area of 1,600 m<sup>2</sup> and is located in the district of Treptow-Köpenick, and the Electrical Guild is willing to make the site available for the construction of a new *KW@B*. The location in the immediate vicinity of the HTW campus and the planned *Innovation and Technology Centre Industry 4.0 (ITZ Industrie 4.0)* of WISTA MANAGEMENT GmbH (WISTA) will enable many synergies, both from a technical point of view, e.g. by integrating lecturers from the HTW into the training and further education courses, as well as with regard to access to specialists or the synergetic use of the joint infrastructure of the HTW, *ITZ Industrie 4.0* and *KW@B*, e.g. through the use of the canteen/cafeteria, through the mutual provision of premises, etc.

Alternative locations for the realisation of the utilisation concept for the investigation of the second thesis were also examined in more detail within the framework of the study in Chapter VI. In view of the specifications of the utilisation concept, no alternative location proved to be more suitable than the planned new building. For this at the site of the Electrical Guild, a concept study was prepared by the Berlin architectural firm *delusearchitects* with three (building) variants, which differ primarily in terms of their size, the associated costs and the consideration of the first monument protection comments:

**Figure 4: Exterior view of the *KW@B***



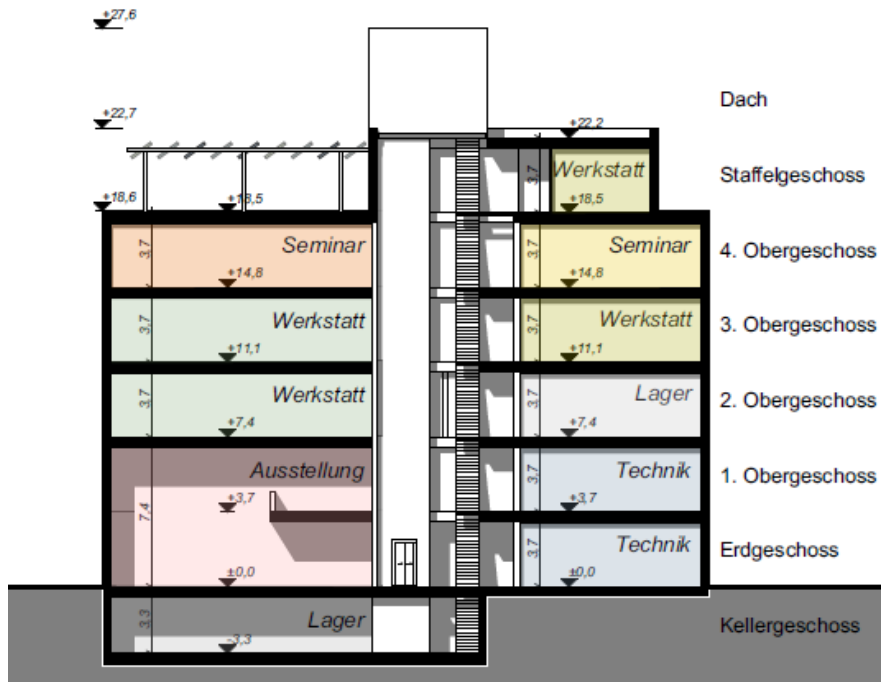
Source: *delusearchitects*, 2022



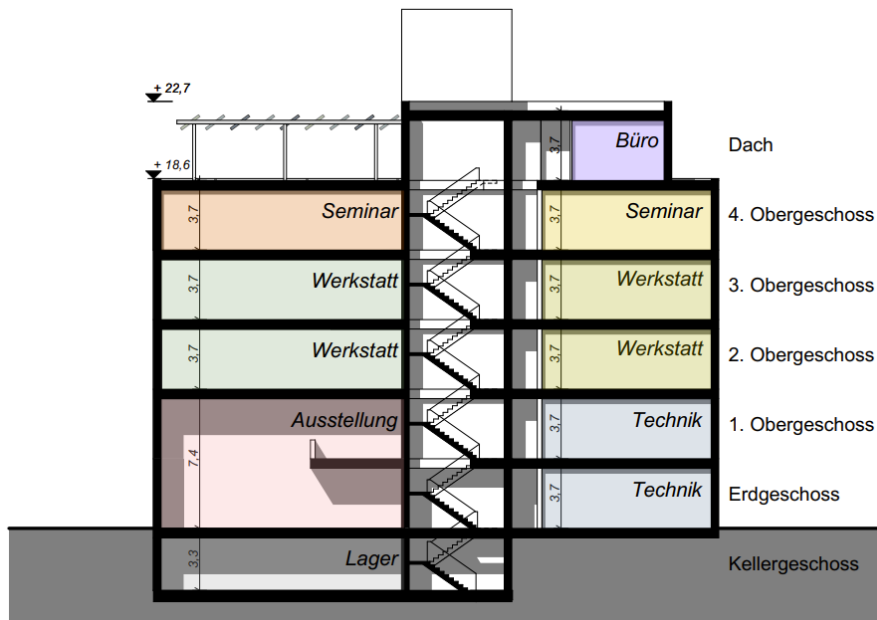
The largest variant 1 as well as variant 2 are planned as six-storey buildings plus a basement to be used as storage. Variant 3 is a smaller variant 2 with one storey less and a full storey instead of a staggered storey as an upper storey, see the following illustration.

**Figure 5: Building sections of KW@B**

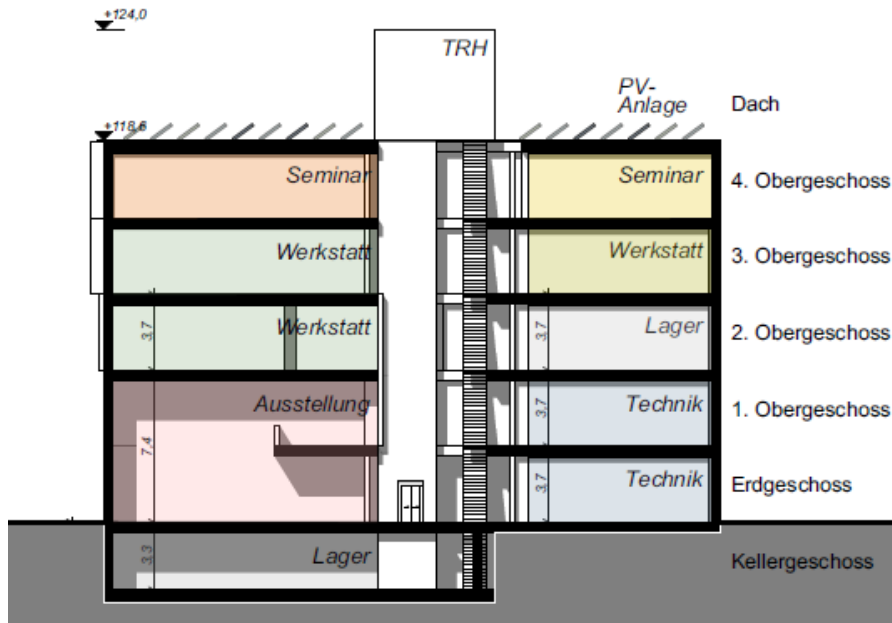
**Variant 1:**



**Variant 2:**



**Variant 3:**

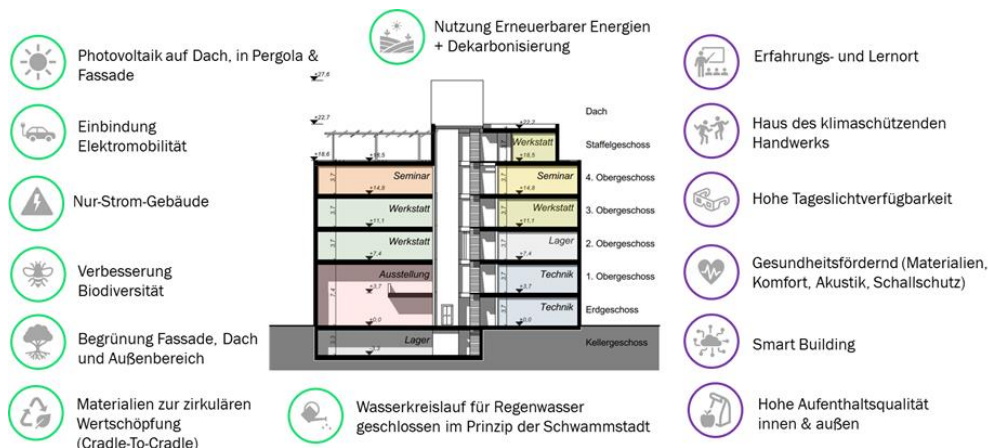


Source: delusearchitects, 2022

Necessary areas, for example, for sanitary facilities, corridors, IT rooms, storage or changing rooms were planned for the floors. On the ground floor and on the first floor (OG) there is an exhibition room that rises over 2 floors, here there are exhibits on the topic of climate change and handicrafts; the room is to be used for larger events and receptions. In addition, there are technical rooms on the ground floor and the first floor, in which essential parts of the building services are housed. These technical rooms are large enough to receive groups of visitors or to hold training courses. On the upper floors in particular, there are larger and smaller workshops, including trainer rooms, as well as seminar and office rooms.

A PV system is planned on the top floor, which takes up 66% of the standard floor area in variant 1, 61% in variant 2 and 54% in variant 3. An initial energy concept was also drawn up as part of the structural feasibility analysis. In this energy concept, cooling, heat and power generation, including for electric mobility, were planned.

**Figure 6: Energy concept of KW@B (in German)**



Source: pom+, 2022

The construction time for this building concept is estimated by delusearchitects to be approximately 18 months, so that if construction were to begin, for example, in June 2024, the Climate Workshop building could be completed as early as possible by December 2025 and thus be in operation by the beginning of 2026.

Based on the construction costs determined in Chapter VI, a profitability analysis for KW@B was developed with the following elements and documented in Chapter VI:

**Figure 7: Elements of the economic feasibility study for KW@B (in German)**



Source: ideas into energy, 2022

First, the investment costs for all variants for a construction start in 2024 were extrapolated for the year 2022 on the basis of the templates from delusearchitects:

**Table 2 Overview of construction costs according to BKI at the start of the construction phase in the first quarter of 2024**

Cost groups KG according to BKI	V1 in €	V2 in €	V3 in €
<b>200 Preparatory measures</b>	537.959	537.959	537.959
<b>300 Building/ Building construction</b>	7.468.960	5.432.596	4.980.583
<b>400 Building/ Technical facilities</b>	4.815.514	3.502.595	3.211.166
<b>500 Outdoor facilities and open spaces</b>	1.016.338	1.016.338	1.016.338
<b>600 Equipment and works of art</b>	787.889	502.198	468.257
<b>700 Incidental building costs</b>	2.469.179	1.787.039	1.638.350
<b>Flat rate for unforeseen costs</b>	1.228.447	893.519	819.175
<b>Total construction costs Net</b>	<b>18.324.286</b>	<b>13.672.244</b>	<b>12.671.827</b>
<b>Total construction costs Gross</b>	<b>21.805.900</b>	<b>16.269.970</b>	<b>15.079.474</b>

Source: ideas into energy, based on the construction cost estimate for 2022 by delusearchitects

In addition to these pure construction costs, the costs for setting up the workshops were estimated at about € 1.7 million and included in the calculation of the investment costs. In addition to these investment costs, the value of the land and the financing costs were also taken into account (financing with 20% equity and 80% building loan at 4% financing costs over 15 years).

**Table 3: Total investment of financing phase KW@B, building version 2**

Property value 2024	965.632 €
Gross construction costs building variant V2	16.269.970 €
Setting up the workshops	1.701.700 €
Fees and interest during the construction phase	595.627 €
<b>Total investment</b>	<b>19.532.929 €</b>

Source: ideas into energy, 2022

In a next step, a first estimate of the annual operating income and expenses was made. The following income from the utilisation concept was included in the calculation:

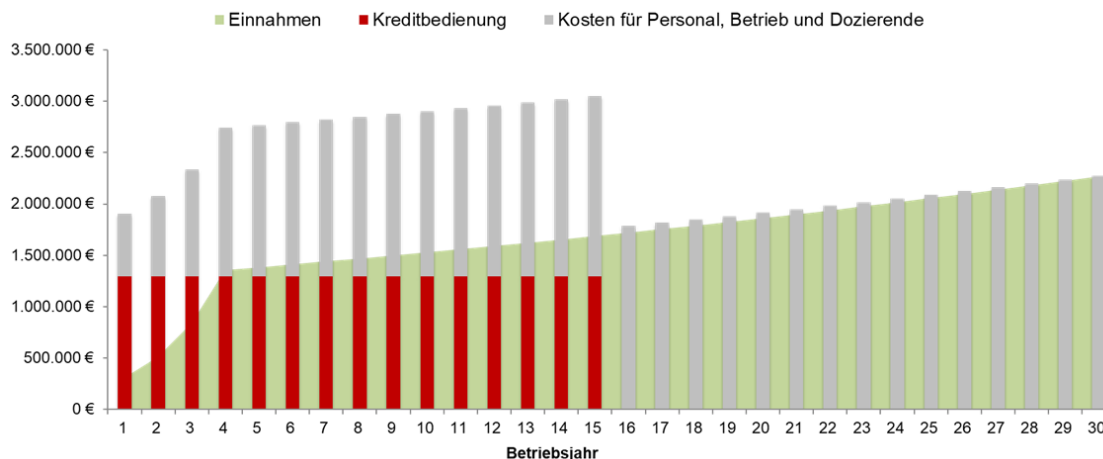
- Training - Inter-trade apprentice training
- Master craftsman preparation courses
- Product-independent training and further education
- Examinations for journeymen and master craftsmen

The expenses are calculated from:

- Costs for lecturers and examination boards
- Personnel costs
- Operating costs (material, building, insurance and overhead costs)
- Insurance costs
- Financing costs

Based on these initial calculations, KW@B will at no time be able to cover its expenses through the intended utilisation concept and thus will not be able to make a profit.

**Figure 8: Economic feasibility of KW@B (in German)**



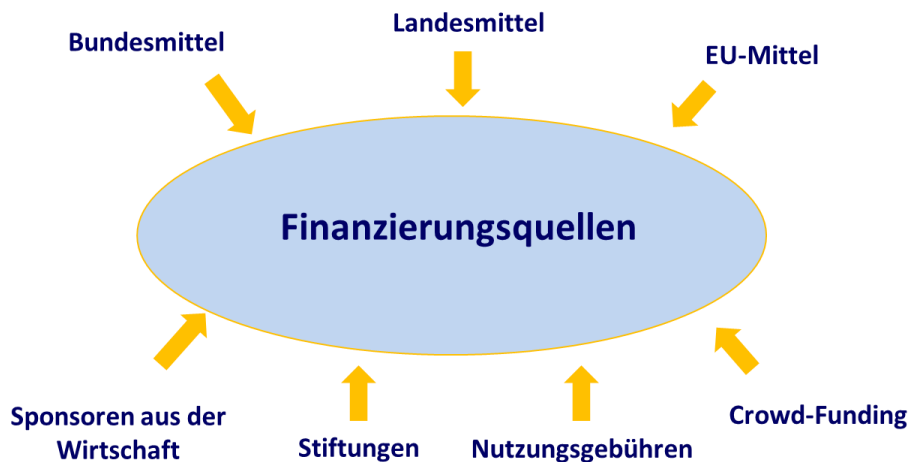
Source: ideas into energy, 2022

In the first 15 years of operation, about 1.4 million € must be spent annually to pay back the building loan. As soon as the building loan is paid off, there is an annual deficit of between 80,000 € and 100,000 € - without institutional public funding. In the interviews with representatives of comparable teaching institutions, it became clear that this estimated annual deficit would be comparatively low in the operation of KW@B.

Finally, in the consideration of economic feasibility in Chapter VI, significant uncertainties of the previously made calculations are discussed, which concern both the future price development of construction costs as well as the revenues to be generated and the planned expenditures.

With regard to the legal form to be chosen for the operation of KW@B, there are various options such as the registered association, the foundation or the non-profit GmbH. However, the question of the choice of legal form can only be decided once the financing mix and the shareholders of a KW@B have been determined, which could not yet be finalised in this study. In principle, the construction and operation of a climate workshop can be financed from a mix of public and private funds:

**Figure 9: Sources of financing for the construction and operation of KW@B (in German)**



Source: ideas into energy, 2022

The accessibility to these funds is again essentially related to the fields of action of the utilisation concept. An examination of the financing of comparable projects has shown that similar educational and adventure sites have been financed primarily from public funds. However, the willingness of private sector actors to also participate financially in such a project can be seen as an important indicator of the need for KW@B to reduce the shortage of skilled workers and secure the existing skilled worker base. Almost no one is against climate protection and would therefore welcome the construction of climate workshops, but only financial participation represents a real commitment.

Chapter VII summarises the results of the study and makes recommendations for further action. A building project designed as a beacon with exemplary character can create a spirit of optimism and show that the issue of a shortage of skilled workers in the skilled trades is being taken seriously in order to achieve climate neutrality in Berlin by 2045 and beyond. The range of possible offers is very diverse and still requires further coordination between representatives of Berlin's skilled trades to develop some cross-trade training and further education offers, as a two-hour meeting of Berlin's guilds for climate trades, the

Berlin Chamber of Skilled Crafts and the team of authors on 3 November 2023 at the office of the SHK Guild Berlin revealed.

**Figure 10** Meeting of the Berlin Climate Guilds, the Berlin Chamber of Skilled Crafts and the team of authors at the office of the SHK Guild Berlin on 03.11.2022.



Source: ideas into energy, 2022

The extent to which the finalised offers are then accepted by the target audience depends on a number of factors: a building with an experiential character can be an important factor in attracting young people, but further measures are needed so that more people consider the skilled crafts as a career path: Some of the reasons that speak against a career in the skilled crafts in Germany can be overcome by a *KW@B*, but in the end the pay must be "right" and the social recognition for the skilled crafts must be given. In addition, the acceptance of the *KW@B* offers, especially in the area of initial and continuing training, also depends on the quality of the courses and the teachers. Within the framework of this study, a first outline of existing (course) offers and providers that will be needed in the future could be made, which must be further detailed by the guilds and the Chamber of Crafts (HWK) in Berlin.

Some future developments in the field of professional qualification were also addressed, e.g. the Bachelor and Master Professional "Trade Coordination" are being developed. Cross-trade, climate-relevant "K-ÜLUs" make a lot of sense according to the climate-relevant guilds, but they do not exist yet and have to be developed first. These and other uncertainties regarding the future training offered in the *KW@B* still lead to some uncertainties in the income and expenditure of a *KW@B* in operations, as presented above and in Chapter VI.

When implementing *KW@B*, but also other measures that contribute to meeting the demand for skilled workers in the skilled crafts sector and at the same time successfully bring about the climate change, time and speed for implementing the measures is an important factor. In other words, no more time must be

lost to take effective steps to reduce the shortage of skilled workers in Berlin's skilled crafts sector. In view of the above-mentioned preparatory conceptual steps that are still necessary and in view of the results of the structural feasibility analysis, the building on the premises of the Berlin Electrical Guild could be completed at the beginning of 2026 at the earliest.

In a project like *KW@B*, which involves the performance of non-profit, sovereign and private-sector tasks, the question of whether the project is worthwhile cannot be answered exclusively with figures: from a purely monetary point of view, a *KW@B* should indeed be operated in such a way that the need for external financing is as low as possible, but many of *KW@B*'s "returns" cannot be directly measured or monetised: it is not possible, for example, to establish a 1:1 relationship between the *KW@B*'s offers to attract young talent associated with short-term expenditures and the long-term benefits that can be achieved for the skilled trades and the energy transition in Berlin. A *KW@B* can contribute to more people choosing a career path in the climate craft, but other factors such as pay in the craft, the social recognition of the craft and the alternative career paths available will also play an equally important role in this decision, which is always an individual one. The added value that *KW@B* can achieve here is therefore not primarily monetary, but above all also of an idealistic nature.

Furthermore, the team of authors sees the planning, construction and operation of such a climate workshop as a model with possible transferability to other regions, as the lack of skilled workers in the skilled crafts sector is not a problem specific to Berlin. The project promoters will therefore use the findings of this study to further exchange ideas with other chambers of crafts and guilds in Germany.

*KW@B* now has a plot of land, an initial structural and economic planning basis and a utilisation concept. In addition, the demand for the necessary capacities for the air-conditioning trade in Berlin has been identified. There is general agreement that cross-trade work will become more important in the future, that the trades will need new skilled workers and that the (Berlin) energy transition will need more skilled workers. Against this background, the climate workshop in Berlin is feasible and all four central questions raised in Figure 1 above could be verified. Despite these findings, there are still some uncertainties, e.g. how concretely the Berlin Senate as well as other public and private donors can support the project financially or with regard to the detailed construction planning.

For *KW@B*, as an important solution building block for its dismantling in Berlin, the following measures are proposed as the next steps for the final examination and preparation for construction of *KW@B*:

1. Activities from January to March 2023: in further meetings of the author team with the HWK Berlin, the Berlin guilds and other Berlin training and further education institutions, it must be clarified which cross-trade training and further education courses as well as examinations should take place at a *KW@B* from 2026 and to what extent in order to finalise the utilisation concept. At the same time, the authors will examine the possible sources of funding more closely with regard to their financing conditions for a *KW@B*. The exhibition concept for attracting young skilled workers will also be further specified, and the shareholder structure of *KW@B* and the appropriate legal constructs for the construction and operating company will be defined.
2. Activities in April and May 2023: Based on the final utilisation concept, the expected income and expenses of a *KW@B* will be further detailed. Depending on changes to the utilisation concept in the course of further coordination in Q1/2023, the basic and elevation plans of the concept study will be adjusted again by delusearchitects.

3. Activities from May to September 2023: Final utilisation concept, final concept study and corresponding income and expenditure plan for *KW@B* are presented to potential public and private donors to close the financing.
4. Activities from October 2023 to June 2024: Once the financing is closed, the structural planning steps (HOAI) can be implemented with the corresponding applications for building permits, etc. According to delusearchitects' estimate, around 9 months are to be estimated for this implementation planning and the building permits.

If the estimated construction time of 18 months is adhered to, the *KW@B* could thus go into operation in January 2026. The time until the *KlimaWerkstatt@Berlin* goes into operation in January 2026 should be used effectively to develop the new training and further education modules for the climate guilds, the Berlin Chamber of Skilled Crafts and other further education providers defined in the utilisation concept and, where possible, to test or carry out pilot training courses at other locations in the capital region in order to counteract the shortage of skilled workers, where this is already possible today.