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Forschung, Entwicklung,
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Zulassung neuer Baustoffe,
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Bauaufsichtlich anerkannte Stelle für
Prüfung, Überwachung und Zertifizierung

Institutsleitung

Prof. Dr. Philip Leistner
Prof. Dr. Klaus Peter Sedlbauer

Summary of IBP-Report WB 260/2018

EU Project MODER -

Mobilization of Innovative Design Tools for Refurbishing of Buildings at District Level

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The responsibility for the content lies with the authors.

Authors:
Heike Erhorn-Kluttig
Eike Budde
Linda Lyslow
Simon Wössner
Hans Erhorn
Konstantinos Koutsomarkos

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Institute leader | Department leader | Person in charge

Fraunhofer-Institut für Bauphysik IBP
Nobelstraße 12 | 70569 Stuttgart
Telefon +49 711 970-00
Telefax +49 711 970-3395
www.ibp.fraunhofer.de

Standort Holzkirchen
Fraunhoferstr. 10 | 83626 Valley
Telefon +49 8024 643-0
Telefax +49 8024 643-366

Content

1 Title

Long version of the project title:

„Mobilisierung von innovativen Design Tools für die Sanierung von Gebäuden auf Quartiersebene (Zufinanzierung des EU-Projekts MODER)“

„Mobilization of Innovative Design Tools for Refurbishing of Buildings at District Level (Co-financing of the EU project MODER)“

2 Motive/initial position

In order to meet the ambitious goals of the EU and Germany for energy saving and reduction of CO_2 emissions in the building sector, energy efficient retrofit measures have to be applied not only at singular buildings but increasingly also at district level. Here, currently planning tools for the early planning stages are missing that are simple to use and deliver reliable results in time for initiating the right approaches towards a high energy efficiency.

3 Subject of the research project

The EU project MODER (Mobilization of Innovative Design Tools for Refurbishing of Buildings at District Level, http://www.vtt.fi/sites/moder) developed an integrated method for energy retrofitting on district level. As first step the existing barriers for the realisation of retrofits on district level were analysed regarding the economy (business models), the required planning tools and the implementation methods. Useful technology packages consisting of measures at the building envelope, the building services systems, controls, centralised energy supply and distribution, renewable energy use and information and communication technologies were defined.

Two planning instruments with different aims and users were further developed and tested within the project. The »District Energy Concept Adviser« (District ECA, German name »Energiekonzept-Berater für Stadtquartiere«) of the Fraunhofer Institute for Building Physic is a tool for the early planning phases that enables urban planners, environmental officers, investors and housing companies to assess the energy-related impacts of various centralised and decentralised energy supply concepts for city quarters. The second tool »Apros District«, developed by VTT, is a dynamic simulation tool for complex energy systems and is used by consultants. In additional work packages available planning methods were analysed and improved and an integrated planning and construction process as well as business models were developed. The tools and methods were tested and validated at case studies.

Fraunhofer IBP was mainly involved in the work package »tool development«. Amongst others the following extensions to the current status of the District ECA were realised here: a cost database allowing the calculation of investment costs of planned retrofit measures and the energy costs before and after the

renovation, as well as additional decentralised and centralised energy supply technologies including storages. So-called technology packages allow for a quick application of retrofit measures combinations on several chosen building types. Additionally the tool is now applicable in further countries due to the provision of national archetype buildings and user profiles. The final version of the tool is available for free and can be downloaded at www.district-eca.com. The application of the tool, which is based on a library with archetype buildings and various default values that can mostly be adapted by the user in only a few steps, is easy, quick and intuitive. The calculation kernel is the German standard DIN V 18599.

Besides the management of the work package »Tool development« and the further development of the D-ECA additional smaller working areas of Fraunhofer IBP concern »Rethinking of refurbishment«, »Technology packages«, »Validation and testing« and »Dissemination and communication«. The public project outcomes including 14 reports in English language are available on the website www.vtt.fi/sites/moder. The four final national versions of the MODER District ECA are available at

- https://www.district-eca.com/images/downloads/SetupModerDE_en.msi
- https://www.district-eca.com/images/downloads/SetupModerFI_en.msi
- https://www.district-eca.com/images/downloads/SetupModerLV_en.msi
- https://www.district-eca.com/images/downloads/SetupModerSI_en.msi.

4 Conclusion

The "District Energy Concept Adviser" of Fraunhofer IBP is a tool for the early planning stages, enabling urban planners, environmental officers, investors and housing companies to assess the energy-related impacts of various centralised and decentralised energy supply concepts for city quarters. Within the project, the tool was extended by important modules: a cost database for the calculation of investment costs and energy costs before and after the retrofit, the addition of further decentralised and centralised energy supply technologies including storages and technology packages allowing the quick application of retrofit combinations to several building types.

5 Basic Information

Short title:	Zufinanzierung des EU-Projekts MODER (Co-financing of the EU project MODER)
Project management:	Dipl.-Ing. Heike Erhorn-Kluttig (Fraunhofer IBP)
Total cost:	771,013.56 €
Proportion of federal subsidy:	292,513.56 €
Project timeline:	35.5 months

6 Figures

Figure 1: Bild_1_Screenshot_Startbildschirm.jpg
Splash screen of the German Version of the District ECA – Edition MODER 2018. © Fraunhofer IBP.

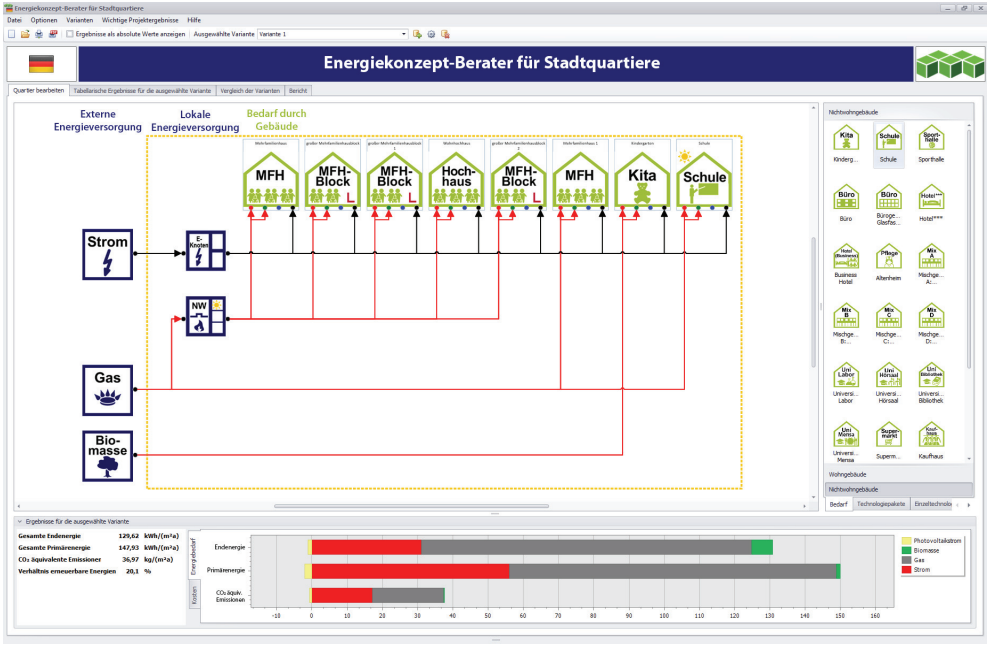

Figure 2: Bild_2_District ECA_Anwendung.jpg
Use of the District ECA.
Big top left window: Configuration – Overview of the district and the chosen archetype buildings as well as the connected local energy generation systems and external energy sources.

Top right window: Archetype building library / choice of technology packages and single technologies that can be applied on several archetype buildings. Bottom window: Quick results – Presentation of the final and primary energy use as well as the CO_2 equivalent emissions of the district. By switching the cost values are shown. Further details of the results are presented in tables, variant comparisons and a report.
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Figure 3: Bild_3_Berechnungsmodi.png
Screenshot of the choice between three different calculation modes within the Distruct ECA. Total calculation of all energy uses, without energy use of the equipment (household equipment, computer, etc.) and based on EPBD Annex I (without equipment and without lighting energy of the residential buildings). A second choice decides between the calculation with or without costs. © Fraunhofer IBP.

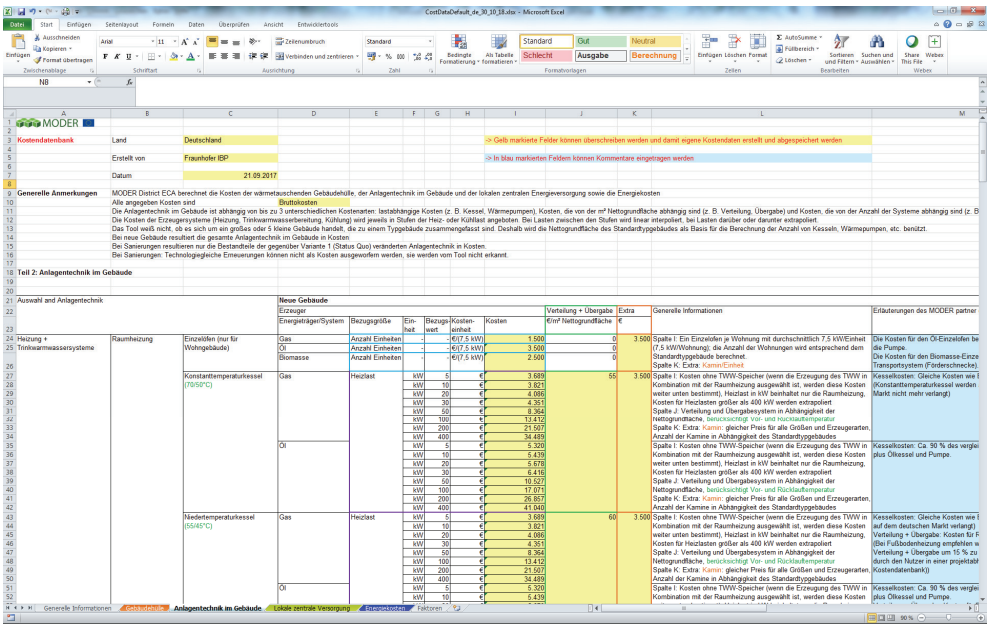

Figure 4: Bild_4_Kostendatenbank.png
German cost database as basis of the cost calculation of the District ECA. Selected is here the part ‚building-wise service systems'. © Fraunhofer IBP.

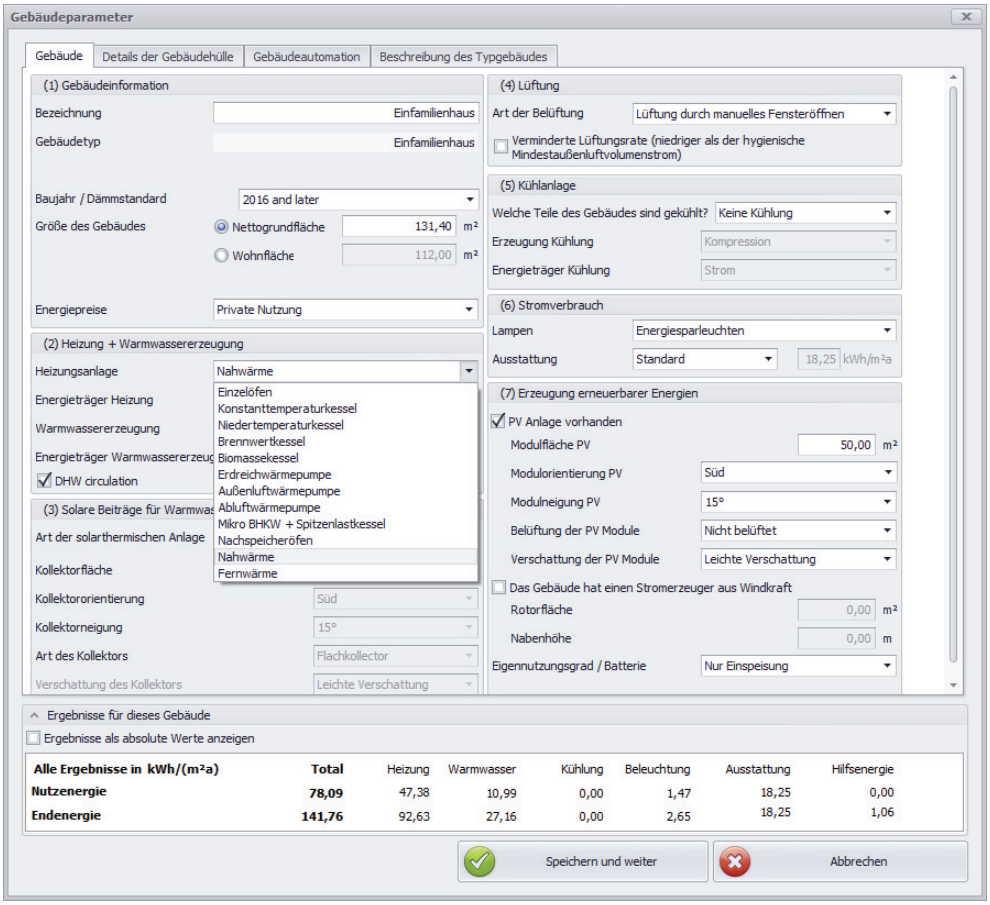

Figure 5: Bild_5_Gebäudeparameter.png
Screenshot of the input fields for adapting the building parameters. Within the District ECA the buildings are grouped to archetype buildings that can be adapted to the real or the planning situation in seven steps. Default values such as age-dependent building envelope qualities can here be overwritten and the building service systems adapted. © Fraunhofer IBP.

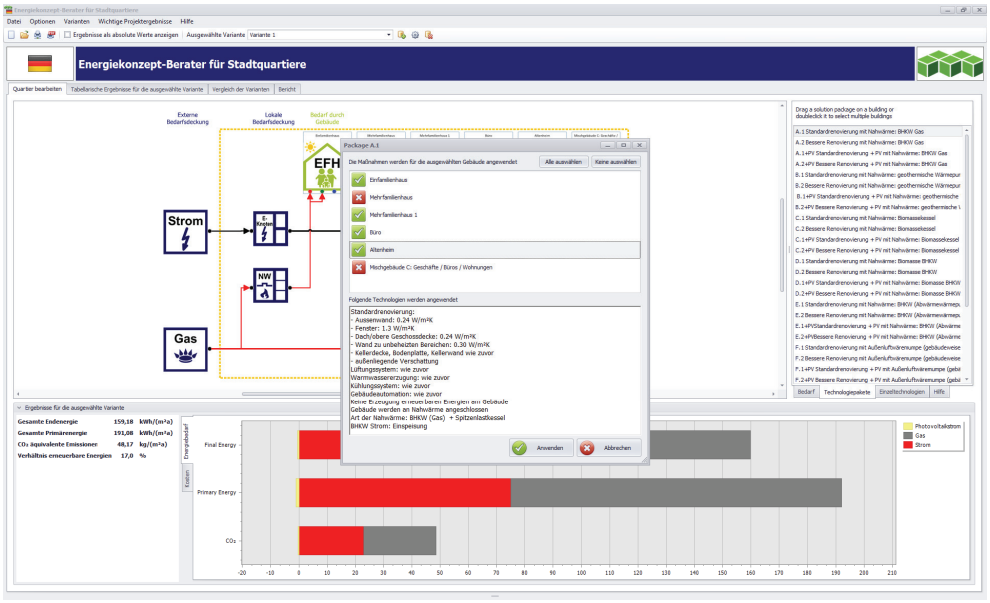

Figure 6: Bild_6_Technologiepakete.png
Screenshot of the application of a technology package (here standard renovation with connection to a local district heating unit (gas-fueled combined heat and power unit)) on several chosen archetype buildings within the district.
© Fraunhofer IBP.

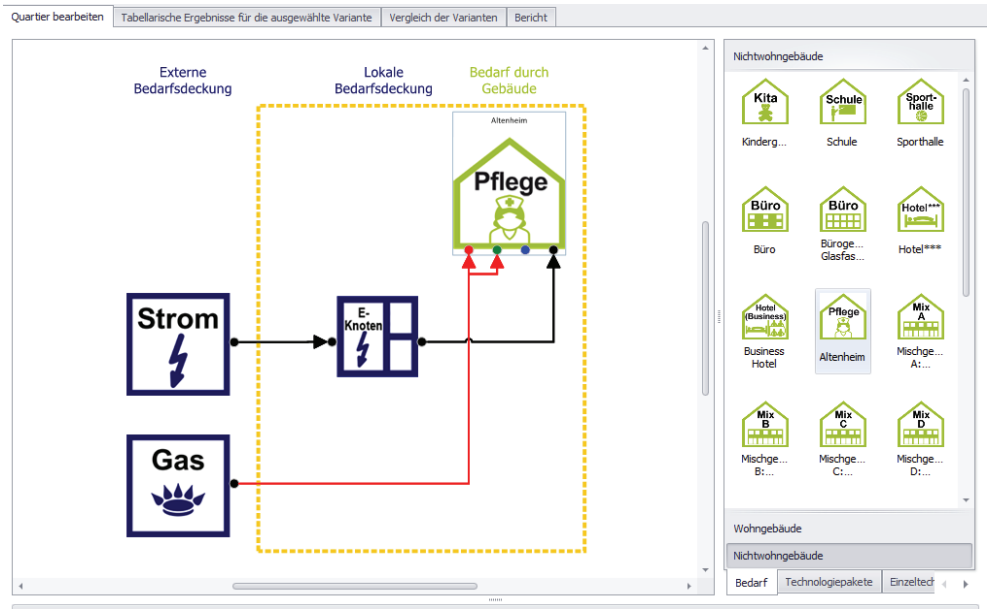

Bild 7: Bild_7_neue_Typgebäude.png
Screenshot of the choice of archetype buildings that can be included per drag and drop into the assessed district. Within the further development of the District ECA all non-residential buildings have been adapted to multi-zone models and multiple archetype buildings have been added (e.g. nursery home, mixed

buildings, various university building types, a larger multi-family house block, etc.). © Fraunhofer IBP.