



Guidelines for nearly zero energy

neighbourhoods

"Guidelines to the pilots for decision"

SINFONIA

"Smart INitiative of cities Fully cOmmitted to iNvest In Advanced large-scaled energy solutions"

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1. PUBLISHABLE EXECUTIVE SUMMARY

Guidelines for nearly zero energy neighbourhoods

http://sinfonia.passiv.de/

Energy efficiency is the key to integration of individual refurbished buildings into an intelligent energy network. The major goal of this guideline database is to facilitate the realization of the upcoming **"nearly zero energy" standard** requested by the EU for 2050 for the building stock, by means of knowledge of already available and **implemented best practice standards**, which sometimes even exceed these goals.

All this is done with a **special focus on refurbishment**. It can be seen as a helping resource for the implementation of already available innovative systems including environmentally-friendly building components, the latest HVAC technologies and low energy consuming devices.

Already during the integrated design process within the Sinfonia demo-projects all approaches to possible solutions and finally implemented solutions are collected in a database. Beside the development of the database a web based GUI-frontend was created making the collection usable as a supporting tool to assist in **finding and comparing already available and affordable best practice retrofit solutions** for buildings.

What makes this resource unique?

Integrated design process

means bringing together the comprehensive knowledge of several project partners from **architecture**, **structural engineering**, **HVAC** and also **building lifecycle management** on the basis of already available and **implemented best practice solutions and standards**. All Sinfonia projects are undergoing this procedure of an integrated design process and the results are made visible through this guideline database.

A public resource of well implemented solutions

In particular, **smaller housing companies** and **private building owners** may have not the experiences and the resources to spend a huge amount of time and money on generating an internal resource of available and already implemented best practice solutions and standards. Bigger housing companies may set up their own resources of well implemented solutions in their own company infrastructures but normally keep it confidential. This often leads to the effect that one has to "reinvent the wheel" for every building project again and again, together with frequently changing partners in the usual design process. To make such a **resource available for public** was one of the biggest aims of this guideline database.



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Collecting implemented as well as alternative best practice solutions

To collect also the **"just discussed" alternative best practice solutions**, sometimes called "lost work", is of general importance as this can be an relevant added value for other building projects. Not implementing a solution in a particular project usually doesn't mean that it is not a best practice solution. It may fits best for another project which has to deal with perhaps only slightly different conditions (regulations, usage, climate, ...).

Combining technical information with a "real life" evaluation

With this guideline database we combine technical information with a **comprehensive** evaluation of the measures. In practice it is not only important to know how to do it, it is also very helpful to get information on pros and cons of a measure in a specific project development. In this way you can get a much deeper picture of the refurbishment measures rather than just getting knowledge of their technical details.





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2. INTRODUCTION

The deliverable D4.1 actually renamed from "Guidelines to the pilots for decision" to "Guidelines for nearly zero energy neighbourhoods" is mostly a web-based application which aims to assist finding available, affordable and within Sinfonia demo-projects practically tested (implemented) best practice retrofit solutions and gives suggestions on applicable alternatives for refurbishment. The renaming should make clearly visible that the resource is open to everyone interested on highly energy efficient refurbishment and is not restricted to the demo projects.

It is intended that this tool is kept alive and updated during the whole project with experiences from the refurbishment projects in the demo cities Bolzano and Innsbruck since practical experiences and conclusions are an essential part of the decision making process. Deliverable 4.1 is some kind of "rolling release" till the end of the project and hopefully further used and maintained beyond that.

The database, located at <u>http://sinfonia.passiv.de</u> contains data from the housing companies of Bolzano and Innsbruck on the different alternative renovation solutions that have been discussed while the planning process and those finally implemented for the demo-projects. It includes details and technical descriptions of measures taken, e.g. U-values of windows, walls etc.. Additional detailed solutions on thermal heat bridges and building service systems are incorporated. Further important and unique information that can be found in the database is a detailed evaluation by the implementing housing companies of each of the measures corresponding to nine different topics.



Figure 1: Evaluation topics in database are getting merged to 5 main categories

The collecting of the data and the compiling process of up to more than hundred values per measure was developed with the open-source program languages Python (a widely used open-source high-level, interpreted, dynamic programming language) together with PHP (an open-source server-side scripting language) in conjunction with an MariaDB SQL database (an open-source relational database management system). The web frontend was realised with a Drupal CMS (a user friendly and powerful content management platform).



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The format of "D4.1 Guideline to the pilots for decision" was not defined in detail in the DOW so it was clarified in accordance with the EC to be a database tool holding all the analysed refurbishment solutions from Innsbruck and Bolzano.

The structure of deliverable 4.1 has now largely been laid out as follows:

1. A database, where details of discussed and finally implemented design variants (thermal envelope, building services, detailed evaluation, etc.) of a refurbishment strategy can be recorded by the implementing housing companies within SINFONIA.

2. Capability of output generation from database, via different filters (predefined and/or user-defined).

3. (Optional) Provision of further guidance combined with pre-existing data of other WP's within SINFONIA project (eg. WP6 - Sets of solution) on how to optimise the refurbishment process, or even give guidance on other projects regarding how to achieve a highly energy efficient refurbishment.

The database **input** so long is restricted to Task 4.1 partners.

The database **output** is intended mainly for the participating housing companies in the two demo cities, the early adopting and follower cities of SINFONIA, but is also open to the general public.



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3. PURPOSE AND SCOPE

Energy efficiency is the key to integration of individual refurbished buildings into an intelligent energy network. The major goal of this guideline database is to facilitate the realization of the upcoming **"nearly zero energy" standard** requested by the EU for 2050 for the building stock, by means of knowledge of already available and **implemented best practice standards**, which sometimes even exceed these goals.

All this is done with a **special focus on refurbishment**. It can be seen as a helping resource for the implementation of already available innovative systems including environmentally-friendly building components, the latest HVAC technologies and low energy consuming devices.

Already during the integrated design process within the Sinfonia demo-projects all approaches to possible solutions and finally implemented solutions are collected in a database. Beside the development of the database a web based GUI-frontend was created making the collection usable as a supporting tool to assist in **finding and comparing already available and affordable best practice retrofit solutions** for buildings.

3.1 MAJOR FUNCTIONALITIES

1. The database itself and its input-GUI:

Here are incorporated all discussed and implemented best practice solutions per project site by the related project and task partners. This encompasses all twenty demo-projects of SINFONIA in Bolzano and Innsbruck. After the SINFONIA-project ends, when all twenty SINFONIA demo-projects will be finalized, more than 500 submissions are expected. As about 100 values per submission have to be specified, the database at the end will contain more than 5000 values.

2. The database output-GUI:

this is a web-based application which aims to assist finding and comparing already available, affordable and tested (implemented) best-practice retrofit solutions within Sinfonia demoprojects (laid out in the database) and suggests possible alternatives for refurbishment.



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3.2 IMPORTANT TOPICS

Important topics of the analysed and implemented building components were:

- Recommendations and specified values for products and construction materials.
- Guidelines for refurbishment extensions; in particular numerous thermal heat-bridges were analysed.
- Analysis of the building process with regard to:
 - standardised elements,
 - high-quality prefabrication,
 - integrated technology,
 - fast and user-friendly refurbishment.

• Recommending and supporting environmentally-friendly and low-energy-consuming components.

- Strengthening local economies through the development of better handcraft / trade skills
- Newly available technologies controlled by quality management.

• Evaluation of façade systems regarding moisture issues and lifespan-prolonging properties (robustness).

The following two main groups of **energy efficient refurbishment measures** (including several sub measures) are covered by this database:

3.2.1 BUILDING ENVELOPE

Based on locally differing practical approaches, the aim is to find detailed and best-practice economic solutions in a well-integrated process with architects, property-companies and local authorities in energy-efficient refurbishment, in accordance with already implemented best practice tools and best replication performance.

Well-defined target values for refurbishment, recommended construction details with a maximum thermal bridge heat loss coefficient for energetically relevant interfaces and specific recommendations for components (including the thermal bridge-minimised building component connection) implemented. are



Figure 2: An uninterrupted insulating envelope – even in old buildings has to be the goal; Resource: <u>PASSIPEDIA (</u>c) Passive House Institute



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Different solution approaches for facades (windows, various materials, thermal bridges, thermal insulation and air tightness) can be compared and analysed. The economic and ecological aspects in order to optimize the construction process, with reference to efficiency as well as long-term properties, are evaluated by the implementing housing companies. The results can be seen as a useful resource for the implementation of already available innovative systems and building components.

3.2.2 INSTALLATIONS AND APPLIANCES

Concepts for building services in energy-efficient refurbishment, which are suitable for the transformation process and for switching to regenerative energy sources are implemented.

Based on the fundamental principle that energy savings of up to 90 % can be made even with refurbishments, detailed concepts and economic solutions in a well-integrated process with the architects, propertycompanies and authorities are shown up.

These are appropriate for high- as well as low-performance ranges regarding the best possibility of replication.



Figure 3: Example of compact heat pump unit combines heating, ventilation and hot water generation in one easy to handle unit; Resource: <u>PASSIPEDIA</u> (c) Passive House Institute



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4. TARGET AUDIENCE

Within the Sinfonia project the database is used by the **housing companies** in the demo cities making discussed variants comprehensible and by the involved **early adoptor cities** as guiding examples.

Beyond Sinfonia it is usable for all involved parties into the decision process for buildings. In particular, **smaller housing companies** and **private building owners** may have not the experiences and the resources to spend a huge amount of time and money on generating an internal resource of available and already implemented best practice solutions and standards. To make such **a resource available for general public** was one of the biggest aims of this guideline database.

The database application as a support tool has **two major functionalities**, as are the publication levels:

 The database input GUI, where all data per project site are incorporated by the related project and task partners. This part has restricted access, and is only accessible by project and task partners involved in the data input.



Figure 4: Picture shows a part of the database input GUI

2. The database output GUI is intended mainly for the early adopting and follower cities, but is also open to the public. Here it is possible to search and compare best practice solutions, which were discussed and implemented within the SINFONIA demoprojects. This part is **open to everyone**, to be accessed via standard internet browser software.



Figure 5: Picture shows a result template of the database output GUI



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5. DISSEMINATION

The Passive House Institute has a long and successful tradition in disseminating all kind of knowledge in behalf of highly energy efficient building technology. Beside the **Sinfonia inbuilt dissemination channels of WP10** additionally the following channels by PHI will be used to promote this guideline database:

- The PHI is hosting several online wikis like <u>www.passipedia.org</u> (constitutes a vast array of cutting edge, scientifically sound, Passive House relevant articles) and platforms like <u>www.europhit.eu</u> (an already finished EU-project; it is all about applied knowledge on deep energy retrofits for step-by-step refurbishments). The Sinfonia Guideline database will be available there as one of the well-used tools offered already there.
- The PHI is carrying out several international activities like the yearly held <u>International</u> <u>Passive House Conference</u> (about 2000 participants out of 45 countries).



Figure 6: "Passive House for all" is the theme for the 21st International Passive House Conference next year in Vienna. A special Sinfonia workgroup is planned here.

Since year 2015 we provide a special **Sinfonia booth** at the International Passive House Conference with overall information about the project and the possibility of deep knowledge extension on refurbishment. As the next conference 2017 will be held in Vienna, we will take the opportunity to organize a special **Sinfonia workgroup** to share first results and skills within the conference. The Guideline database will be sure one part of this.



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The Mid-year Passive House days together with the International Passive House Days



Figure 7: Two times a year the Mid-year Passive house days (in June) and the International Passive House days (in Nov.) offer visitors the chance to experience the benefits of highly energy efficient buildings at first hand.

put on by **iPHA** (International Passive house Association) and its international Affiliates, will take place for the 13th year in a row now. By participating with your own Passive House home, office, or even construction site, Passive house owners can share their experiences and show what Passive House is all about. Spread the word and offer others the chance to experience the benefits of highly energy efficient buildings live. The International Passive House Days are held in up to **25 countries**, opening about **700 homes, offices and public buildings** like schools (also yet finished Sinfonia projects in Innsbruck will take part this year for the first time) to about **10-15.000 visitors** each year.

 Within the EU-project <u>EuroPHit</u> a new online certification platform was introduced by PHI. It is expected that the "Sinfonia - Guideline database" will be connected to this certification platform as a central part to collect further more best practice solutions. The aim is to fill the database additionally with solutions other than just Austrian and north Italian to be able to consult Passive House planners and designers all over the world with high energy efficient retrofit best practice solutions.



Figure 8: New online certification platform

Quality assurance, like it is also foreseen in WP7 and WP8, is since nearly 15 years a major task by the PHI to foster the paradigm shift on how to build an environmentally friendly future. For **building certification**, a certificate is only issued if the exactly defined criteria have been

met without exception. Actually there are 40 accredited Passive House certifiers and 537 certified Passive House Designers/Consultants to certify Passive House buildings and EnerPHit retrofits anywhere in the world on behalf of the Passive House Institute and in accordance with their criteria. The usage of the newly introduced **online certification platform** in combination with the "Sinfonia - Guideline database" is obligatory and will so foster a quick and wide spread of high energy efficient retrofit best practice solutions.



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6. INVOLVED SINFONIA PARTNERS

A close collaboration of experienced practitioner and scientific partners is important to gain the goal of integrated design on Sinfonia project level the same as on local building project level.



Figure 9: Partner-structure of Task 4.1

6.1 EXPIERENCED PRACTITIONER PARTNERS

- BOZ integral design process, implementation, evaluation and data input
- IIG integral design process, implementation, evaluation and data input
- **IPES** integral design process, implementation, evaluation and data input
- NHT integral design process, implementation, evaluation and data input

6.2 SCIENTIFIC PARTNERS

- ACC assisting integral design process and data input of Bolzano partners
- **EURAC** assisting integral design process, research on best practice solutions
- **UIBK** assisting integral design process, research on best practice solutions
- PHI assisting integral design process and data input of Innsbruck partners, research on best practice solutions, development and maintenance of web based guideline database



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7. DETAILED INTENTION

The idea(s) behind this guideline database

What makes this resource unique?

7.1 AN INTEGRATED DESIGN PROCESS IS THE KEY

An integrated design process is the key to achieve the goal of "nearly zero energy" standard, especially when undertaking **large-scale refurbishments**.

It means bringing together the comprehensive knowledge of several project partners from **architecture, structural engineering, HVAC** to also **building lifecycle management** on the basis of already available and **implemented best practice solutions and standards**.

All Sinfonia projects are undergoing this procedure of an integrated design process and the results are made visible through this guideline database.

7.2 MAKING AVAILABLE A PUBLIC RESOURCE OF WELL IMPLEMENTED SOLUTIONS

Bigger housing companies do take the integrated design seriously nowadays, which in some cases leads to the fact that they set up their own resources of well implemented solutions in their own company infrastructures.

In particular, **smaller housing companies** and **private building owners** may have not the experiences and the resources to spend a huge amount of time and money on generating an internal resource of available and already implemented best practice solutions and standards. This often leads to the effect that one has to "reinvent the wheel" for every building project again and again, together with frequently changing partners in the usual design process.

To make such a **resource available for public** was one of the biggest aims of this guideline database.

7.3 COLLECTING IMPLEMENTED AS WELL AS ALTERNATIVE BEST PRACTICE SOLUTIONS

The first and probably most commonly taken step is to collect all relevant data of an **implemented best practice solution**. Within Sinfonia all serious approaches to solutions are collected already during the planning process also in the very first design phases.

So in addition, it was decided here not only to collect data of the finally implemented best practice solutions (as usual if it's done at all) but also the **"just discussed" alternative best practice solutions.** They usually come up in a first design step and may be overhauled later in the design process.



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To collect this "lost work" is of general importance as this can make the decision process more transparent. Not implementing a solution in a particular project usually doesn't mean that it is not a best practice solution. It eventually fits best for another project which has to deal with only slightly different conditions (regulations, usage, climate, ...).

All thoughts, taken decisions and detailed data is now still available and one is now able to handle the design process of upcoming building projects much faster and more reliably.

7.4 COMBINING TECHNICAL INFORMATION WITH A "REAL LIFE" EVALUATION

With this guideline database we try to combine technical information with a **comprehensive evaluation of the measures**. In practice it is not only important to know how to do it, it is also very helpful to get information on pros and cons of a measure in a specific project development. The implementing housing companies are doing an evaluation on up to 50 values categorized into 9 topics:

- costs
- legal affairs
- position and orientation
- architectural design
- ecological impact
- construction process
- technical feasibility
- general risks
- energy efficiency

In this way you can get a much deeper picture of the refurbishment measures rather than just get knowledge of their technical details.

7.5 OTHER RESOURCES

It is surprising, but doing an intense search on best practice refurbishment solutions in the WWW mostly brings up some descriptions of single measures or projects, often by other research projects or by companies manufacturing and selling refurbishment materials and components.

Additionally there are some good written compendiums available (an regulary updated list of advisable literature on energy efficient refurbishment is also available <u>here</u>). A collection of realized projects was done during the EU-project <u>EuroPHit</u> - Retrofitting for the energy revolution, one step at a time - it is all about applied knowledge on deep energy retrofits to the oft-overlooked yet critical area of step-by-step refurbishments (for an regulary updated collection of advisable web resources see also <u>here</u>).



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7.6 APPROACH AND ITS STRUCTURE

To develop a robust and flexible structure for such a resource, always having in mind that the database must be accessible and user-friendly, is very important. The following stages will demonstrate the used approach:



from acquisition to a possible guideline first was analysed:



Figure 10: Data flow from acquisition to guideline

7.6.2 DISCRETE GROUPS OF MEASURES WERE IDENTIFIED

as the parts that make up an integrated design process with the goal of "nearly zero energy" refurbishment, and inserted into a database input-GUI:



Figure 11: Identified groups of measures



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7.6.3 A WIDE RANGE OF DIFFERENT DECISION CATEGORIES

have to be made in practice; thereby an **evaluation** takes place:



7.6.4 INPUT-OUTPUT SCENARIO

This leads to a possible I/O-scenario, building upon the measure and evaluation input:

INPUTS Description of the refurbishment measures Realized measures Alternatively discussed measures Other relevant possibilities (eg. wood construction for the façade...) Evaluation of the measures in the specific projects OUPUTS Output as guideline database Experience directly available and documented for the pilot cities Measures examples for the observer cities Housing companies and private building owners do not have to

Figure 13: Diagram of input-output scenario



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7.6.5 A SCHEMATIC ANALYSE OF THE DECISION-MAKING PROCESS



took place at planning stage right within the integrated design process:

Figure 14: Diagram of schematic decision-making process

7.6.6 THE PRACTICE IN STANDARD DESIGN PROCESSES

in comparison to the schematic analyse is often more like the following:



Figure 15: Diagram of decision-making process in practice



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7.6.7 THE SETUP OF A DATABASE LAYOUT

upon these initial thoughts and findings has to be the next step:

Data collection (Transparent Components) Passive House Institute **TR-01** description / name **Properties** Material/Product: Frame U_f-value: [W/m²K] *range=0,20-2,50* Glazing Description/Product: U_a-value: [W/m²K] *range=0,30-5,80* *range=0,10-0,90* g-value: Glazing edge Ψ-value: [W/mK] *range=0,020-0,060* Flush with outer In insulation level Installation In wall construction edge of wall Frame insulated Frame not insulated Ψ-value: [W/mK] *range=-0,020-0,100* Percentage Ratio of the building: [%] *range=0-100* Decisions

Pas	sive Hi	ouse			D	ata	a coll	ectio	n (De	cisio	ns)
Instit	tute											
XX	-01									descr	iption / na	ame
	Pro	operties										
	Dee	cisions (only contra-decisions to cho	oose, pro-decisions a	are set	t as default)							
		Costs	Investment product	ln ir	vestment stallation		Running/ Operating	Maintena	nce	S	ubsidies	
		Legal affairs	Tenancy law		Rent Act	В	uilding law	Tenant approva	is al	C pr	ityscape otection	
		Situating & Orientation	Compactness		Shading	W	indow area	Other:	_]	Desc	ription:	_)
		Architectural design	Materials		Form?		Surfaces	Other:	_]	Desc	ription:	_]
		Ecological aspects	Embodied energy	F	Petroleum product	Gre	enhouse gas	Other:	_)	Desc	ription:	_)
		Construction process	Dirt pollution	Noi	se pollution	Inh	abited state	Measure is consumi	time ing			
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		Risks	Fire prevention	L	egionella	Buil	ding damage	Thermal co	mfort	Noi	se comfort	
		Heat loss building service	Storage	D	istribution	Othe	er:					
		Energy efficiency	SINFONIA?	re	National gulation?	E	EnerPHit?	Other:	_			
			Heating demand: [kWh/(m²a	a)]	Heating load	l: /m²]	Freq. of over [%]	heating:	PE de	emand: [kW	h/(m²a)])
		Further aspects / Other	Other:									

Figure 16: Setup of data collection for the database layout



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7.6.8 THE DATABASE

finally was generated as a relational database system (RDS) using an open-source MariaDB SQL database.

phpMuAdmin	🔶 🍯 Server: Main Database » 🍘 Datenbank: sinf	ionia-drupal		
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+ w authmap	userprotect	🚖 🗐 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~ ³⁵ InnoDB utf8_general_ci ¹⁶ KiB	-
🖶 😿 backup_migrate_destinatio	users	🚖 🗐 Anzeigen 🎉 Struktur 🤹 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~34 InnoDB utf8_general_ci 112 KiB	-
backup_migrate_profiles	users_roles	🌟 🗐 Anzeigen 📝 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~ ³³ InnoDB utf8_general_ci ^{32 KiB}	-
backup_migrate_schedule:	variable	🚖 🗐 Anzeigen 🎉 Struktur 🤹 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~275 InnoDB utf8_general_ci 96 KiB	-
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H DIOCK	views_display	🚖 🗐 Anzeigen 🞉 Struktur 🤹 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~4 InnoDB utf8_general_ci ^{80 K1B}	-
+ block custom	views_view	🚖 🗐 Anzeigen 🙀 Struktur 🁒 Suche 👫 Einfügen 🚍 Leeren 😂 Löschen	~3 InnoDB utf8_general_ci 32 K1B	-
+ block node type	votingapi_cache	🚖 🗐 Anzeigen 🙀 Struktur 🤹 Suche 🐉 Einfügen 🚍 Leeren 🤤 Löschen	~ ⁰ InnoDB utf8_general_ci ⁹⁶ KiB	-
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+ 🖌 cache_block	webform	🚖 🗐 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~25 InnoDB utf8_general_ci 64 KiB	-
+ cache_bootstrap	webform2pdf	🖕 🗐 Anzeigen 🎉 Struktur 🤹 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~1 InnoDB utf8_general_ci 16 KiB	-
+ k cache_field	webform_component	🚖 🗐 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~10,808 InnoDB utf8_general_ci 8,5 M1B	-
+-y cache_inter	webform_conditional	🚖 🗐 Anzeigen 🞉 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🥥 Löschen	~891 InnoDB utf8_general_ci 48 K1B	-
+ cache image	webform_conditional_actions	🚖 🗐 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🥥 Löschen	~1,097 InnoDB utf8_general_ci 96 KiB	-
+ cache_libraries	webform_conditional_rules	🚖 📑 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~1,520 InnoDB utf8_general_ci 128 KiB	-
🕂 🖌 cache_menu	webform_emails	🚖 🗐 Anzeigen 📝 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~43 InnoDB utf8_general_ci 160 KiB	-
+ k cache_page	webform_last_download	🖕 🗐 Anzeigen 🎉 Struktur 🤹 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~7 InnoDB utf8_general_ci 16 KiB	-
+ K cache_path	webform_report	🚖 🗐 Anzeigen 🙀 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~31 InnoDB utf8_general_ci 48 KiB	-
	webform_roles	🚖 🗐 Anzeigen 🞉 Struktur 👒 Suche 👫 Einfügen 🚍 Leeren 🤤 Löschen	~92 InnoDB utf8_general_ci 16 K1B	-
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+ k cache_views	webform_validation_rule	🚖 🗐 Anzeigen 🙀 Struktur 🤹 Suche 💱 Einfügen 🚍 Leeren 🤤 Löschen	~23 InnoDB utf8_general_ci 32 KiB	-
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Figure 17: database layout viewed in phpMyAdmin SQL database administration tool.

7.6.9 THE WEB-BASED DATA INPUT-GUI

had to follow the needs of an accurate but easy to handle data input.





GUIDELINES TO THE PILOTS FOR DECISION

GUIDELINES FOR NEARLY ZERO ENERGY NEIGHBOURHOODS

COLLABORATIVE PROJECT; GRANT AGREEMENT NO 609019

WORK PACKAGE: 4 VERSION: 01 DATE: 12.09.2016

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SINFONIA; "Smart INitiative of cities Fully committed to iNvest In Advanced large-scaled energy solutions" has received funding from the European Union's Seventh Programme for research, technological development and demonstration.

GUIDELINES TO THE PILOTS FOR DECISION

GUIDELINES FOR NEARLY ZERO ENERGY NEIGHBOURHOODS

COLLABORATIVE PROJECT; GRANT AGREEMENT NO 609019

WORK PACKAGE: 4 VERSION: 01 DATE: 12.09.2016

Durchsuchen Keine Datei ausgewählt.	http://	Durchsuchen Keine Datei ausgewählt.
Upload	www.product_datasheet.com	Upload
Please upload the product datasheet here	or provide a link to the product datasheet here.	Upload document here.
Files must be less than 2 MB.		Files must be less than 2 MB.
Allowed file types: jpg jpeg png pdf.		Allowed file types: jpg jpeg png pdf.
Window installation:		
Position of installation	Please mark the planned window frame extra insulation	Window installation Psi-value
	additional insulation at the outside of the frame, not	Psi = 0,025 [W/mK]
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Upload sketch or design plan here.		
Files must be less than 2 MB.		
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Figure 18 (above) & 19 (below): Input of technical data and evaluation for measure "transparent component"

valuation					
Please <mark>evaluate</mark> this refurbishment measur	e carefully:				
lease notice:					
 please check the box "irrelevant" ONLY if the invest about the topic (for example "operation costs" for an please check the box "no info" if you have no infort Please don't forget to complete the form as soon as checking the box "prohibitive" or "not acceptable this measure can hardly be realized for a refurbishme checking the box "neutral" or "acceptable" means no particular impact on this specific topic. checking the box "beneficial" or "attractive" means in the implementation of this measure for a typical result. 	tigated measure <u>do</u> external door). nation on the specif you get the informa " means that BEC/ ant project under th s that the investigat ns that there is a <u>g</u> furbishment project e:	es not say anyt ic topic. ttion! AUSE of this spe e current condi ced measure ha ood or strong a t relatively to th	hing scific topic, tions. s dvantage iis specific topic.		
Evaluation of the costs: Please evaluate the costs of the refurbishment measur	e described above.	no info	prohibitive	accentable	attractive
Investment in product	O	0	O	O	۱
	irrelevant	no info	prohibitive	acceptable	attractive
Investment in installation	0	0	0	۲	0
	irrelevant	no info	prohibitive	acceptable	attractive
Operation costs	۲	0	0	0	0
	irrelevant	no info	prohibitive	acceptable	attractive
Maintenance costs	۲	0	0	0	0
	irrelevant	no info	no subsidy	standard	attractive
Subsidies possibility	0	0	0	۲	0
	irrelevant	no info	prohibitive	acceptable	attractive
Other costs (optional)	0	0	0	0	0
Disass add a short description to other pasts have		_			



SINFONIA; "Smart INitiative of cities Fully committed to iNvest In Advanced large-scaled energy solutions" has received funding from the European Union's Seventh Programme for research, technological development and demonstration.

COLLABORATIVE PROJECT; GRANT AGREEMENT NO 609019

WORK PACKAGE: 4 VERSION: 01 DATE: 12.09.2016

Compatibility with legal affairs:

Please evaluate the compatibility of this refurbishment measure with legal affairs.

	irrelevant	no info	not compatible	compatible	e beneficial
Building law	0	0	0	۲	0
	irrelevant	no info	not compatible	compatible	e beneficial
Rent act	0	0	0	۲	0
	irrelevant	no info	not compatible	compatible	e beneficial
Tenancy law	0	0	0	۲	0
	irrelevant	no info	< 50% approval	50% - 90%	all tenants agree
Tenants approval	0	0	0	۲	0
	irrelevant	no info	not compatible	compatible	e beneficial
Cityscape protection	0	0	0	۲	0
	irrelevant	no info	not compatible	compatible	e beneficial
Other legal affair (optional)	0	0	0	0	0
Please add a short description for this other legal	affair here				

Evaluation of the architectural design:

Please evaluate impact of the architecural design of the refurbishment measure.

	irrelevant	no into	prohibitive	standard	attractive
Materials	0	0	0	0	۲
	irrelevant	no info	prohibitive	standard	attractive
Shape	0	0	0	0	۲
	irrelevant	no info	prohibitive	standard	attractive
Surfaces	irrelevant	no info	prohibitive	standard	attractive
Surfaces	irrelevant O irrelevant	no info	prohibitive O prohibitive	standard O standard	attractive attractive
Surfaces Other (optional)	irrelevant	no info	prohibitive prohibitive	standard o standard o	attractive attractive

Please add a short description on other impact of design here ...

Evaluation of the ecological impact:

Please evaluate this refurbishment measure in terms of its ecological impact.

	irrelevant	no info	prohibitive	standard	low
Amount of embodied energy	0	0	0	۲	0
	irrelevant	no info	prohibitive	standard	low
Amount of petroleum based content	0	0	0	0	۲
	irrelevant	no info	prohibitive	standard	low
Impact on greenhouse gas emissions	0	0	0	0	۲
	irrelevant	no info	prohibitive	standard	low
Other impact (optional)	\circ	$^{\circ}$	\circ	\circ	0

Disturbances in the construction process:

Please evaluate the disturbances generated during the realisation of this refurbishment measure.

	irrelevant	no info	prohibitive	acceptable	low
Generation of dirt pollution	۲	0	0	0	0
	irrelevant	no info	prohibitive	acceptable	low
Generation of noise pollution	۲	0	0	0	0
	irrelevant	no info	prohibitive	acceptable	low
Duration of construction	0	0	0	0	۲
	irrelevant	no info	prohibitive	acceptable	low
Obstacles due to occupancy	0	0	0	۲	0
	irrelevant	no info	prohibitive	acceptable	low
Other (optional)	0	0	0	0	0
Please add a short description on other obstacle on constr. p	process here				



COLLABORATIVE PROJECT; GRANT AGREEMENT NO 609019

WORK PACKAGE: 4 VERSION: 01 DATE: 12.09.2016

	irrelevant	no info	not ava	ilable st	andard qua	lity	hiah ayali
Availability of the products	0	0	0		0	,	۲
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omestic hot water consumption		۲)	0	0	0	0
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lectricity consumption			0	0	0		0
		irrele	vant	no info	higher	equal	lowe

Evaluation on an additional topic:

If you weren't able to evaluate or find an important topic above, you can add it here.

- D Other evaluation (optional) -

Personal rating / Global review:

Please enter additional personal information here (e.g. why do you like this measure, or you don't like it; whether there are negative evaluations above, but it is really preferable in a other context; etc.). Feel free to document your personal expression on this measure.

This is a great refurbishment window.

How many stars you would give this measure personally? Please choose from none up to five stars! (the more the better)



SINFONIA; "Smart INitiative of cities Fully committed to iNvest In Advanced large-scaled energy solutions" has received funding from the European Union's Seventh Programme for research, technological development and demonstration.

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7.6.10 POSSIBLE OUTPUT SCENARIOS OF THE GUIDELINE DATABASE

Following figures showing up a bandwidth of already realized and possible output scenarios:

Passive House		GUI of report generato Example: GUI for offline PDF document and report generation			
Institute					
🖨 🔒 PHI-IBK	» < 🕲 sinfonia.passiv.de/node/2				
Sinfonia	SINFONIA - Low Carbon cities for better living	My account Log out			
Choose measure category	Please choose measure you are asking for: Transparent components (TR) ~				
B JIG projects Base information for Came report	For further help on how to create your own report, which measures are supported and how to use Help on input name, version number & date? - click here Building type	It in your design process			
Database overview Submissions overview	To see the list of previously used names here, try autocomplete with "a", "e", "i", "o" or "u". Construction type				
avigation	To see the list of previously used names here				
Contact	Energy efficiency key figures ·				
Search	Piese indicate which energy standards should get reached by your project after refurbishment.				
Restrict report	Enter country : TR	Mar Mar Mar			
to construction year	Enter country code for evaluation of measures different climate zones Year of original construction Current project phase				
	Day Month V Year Im - See halo above for more info & exampler	For more details on the project phases click here.			

Figure 20: The report generator is the starting point to generate output. There will be more and more choices to take as there become more and more input data available.



Figure 21: As a first step HTML-documents are generated by the report generator, which can then be locally stored or printed.



0

GUIDELINES TO THE PILOTS FOR DECISION

GUIDELINES FOR NEARLY ZERO ENERGY NEIGHBOURHOODS



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Figure 22: These reports can be used eg. to compare different implemented or suggested single measures on behalf of the given evaluation by the implementing housing companies.



Figure 23: In principal it would be possible to use the collected data to analyse the steps of refurbishment (not yet implemented). This only can take place if the given data is as accurate as possible along the layout of the developed database structure.



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8. TECHNICAL DOCUMENTAION AND BACKGROUND

This guideline database is established on several open-source technologies:

• Content Management System (CMS) by Drupal

It is used to generate the main web front end to the user and to provide the data input to the project partners. It is a user friendly and powerful content management platform for building nearly any kind of website: from blogs and micro-sites to collaborative social communities.

• Drupal is distributed under the <u>GNU General Public License</u>.

Sinfonia	My account Log out					
Main menu						
Public home	Welcome to					
Purpose and scope	Guidelines for pearly zero epergy peighborhoods					
o Target audience	Guidetines for hearty zero energy heighborhoods					
P Involved partners	Energy efficiency is the key to facilitating integration of energy optimised individual buildings into an intelligent energy network. The major goal of this					
> Detailed intention	guideline database is to facilitate the upcoming "nearly zero energy" standard requested by the EU for 2020, and also for 2050, by means of knowledge of					
 Decumentation 	already available and implemented best practice standards, which sometimes even exceed these goals. It can also act like a supporting tool to assist in finding and comparing already available and affordable best practice retrofit solutions for buildings.					
Decementation Decementation Decementation						
CT107 CT10C1	All this is done with a special focus on refurbishment. It can be seen as a helping resource for the implementation of already available innovative systems					
STAKT SEAKUH	including environmentally-friendly building components, the latest HVAC technologies and low energy consuming devices.					
Vacabase						
disclaimer	Come and have look at the next level of energy efficient refurbishment in the cities of Europel					
D Database entry	come and nave look at the next level of energy endeat relationshimment in the cales of Europer					
o Database overview						
 Submissions overview 	Related project and task partners:					
Database testing						
Database administration						
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Figure 24: Screenshot of sinfonia.passiv.de web frontend realised with Drupal 7.0

<u>PHP</u> a server-side scripting language

designed primarily for web development but is also used as a general-purpose programming language. PHP code was used to extend the functionality of the Drupal CMS system e.g. in case of the comprehensive data input forms. Drupal CMS itself is also based on PHP.

• The standard PHP interpreter, powered by the Zend Engine, is free software released under the <u>PHP License</u>.



Figure 25: PHP logo



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• SQL Database System by MariaDB

an open-source relational database management system (RDBMS). It was used to setup the according database layout for this task. As about 100 different values per submission have to be specified, the database at the end will contain more than 5000 values.

• MariaDB is intended to remain free under the GNU GPL.

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	Information Speicherpla Daten Index	1,6 MB	Datensatz-St Format Kollation	atistikon Compact sf0_general_ci						
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Figure 26: Guideline database layout viewed in <u>phpMyAdmin</u> SQL database administration tool.

- <u>Python</u> a high-level, interpreted, **dynamic programming language**. It was used to generate the dynamic database output to the public. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles.
 - <u>CPython</u>, the reference implementation of Python, is <u>free and open-source</u> <u>software</u>.



Figure 27: Python logo



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9. OTHER RESOURCES

9.1 ADVISIBLE LITERATURE ON ENERGY EFFICIENT REFURBISHMENT

- Wolfgang Feist, Passive House Institute: various refurbishment related literature:
 - Research Group Volume 30: 2004 Ventilation in refurbishments Link
 - <u>Research Group Volume 32</u>: 2005 Factor 4 reduction for sensitive retrofits: Passive House components + interior insulation - <u>Link</u>
 - <u>Research Group Volume 39</u>: 2009 Step-by-step refurbishment with Passive House components <u>Link</u>
 - <u>Research Group Volume 48</u>: 2009 Refurbishment of non-residential buildings Link
 - <u>EnerPHit Planning Handbook</u>: 2012 Compendium of refurbishing existing buildings with Passive House Components - <u>Link</u>
 - <u>Passive House Planning Package Version 9</u>: 2015 an easy to use planning tool for energy efficiency for the use of architects and planning experts. Now with special output file for EnerPHit Retrofit and step-by-step retrofits. <u>Link</u>
- <u>3enCult</u> Energy Efficiency Solutions for Historic Buildings Combining the existing knowhow of the experts involved, it is a helpful guide for many building owners and professionals tackling the renovation of their specific historic building. - <u>Free PDF Download</u>
- R. Vallentin: Energieeffzienter Städtebau mit Passivhäusern Begründung belastbarer Klimaschutzstandards im Wohnungsbau, Dissertation TU; München, Göttingen: 2011 (ISBN 976-3-86955-673-4)
- Doris Haas-Arndt, Fred Ranft: Informationspaket "Altbauten sanieren", BINE Informationsdienst, FIZ Karlsruhe, 2008 (<u>ISBN 978-3-934595-78-1</u>)
- <u>Burkhard Schulze Darup</u>: Energieeffiziente Wohngebäude, BINE Informationsdienst, FIZ Karlsruhe, 2009 (<u>ISBN 978-3-934595-82-8</u>)
- Ingo Gabriel, Heinz Ladener (Hrsg.): Vom Altbau zum Niedrigenergie + Passivhaus, ökobuch Verlag, Staufen bei Freiburg, 2010 (ISBN 978-3-936896-46-6)
- Friedrich Heck: Energiekosten senken Kosten und Nutzen von Wärmedämmmaßnahmen, Fraunhofer IRB-Verlag, Stuttgart 2007 (<u>ISBN 978-3-8167-7372-6</u>)
- **4. Internationales Anwenderforum**: Energetische Sanierung von Gebäuden, OTTI, Regensburg, 2010 (ISBN 978-3941785-11-3)
- Josef Maier: Ausbau von Dachgeschossen Ein Praxisleitfaden zum Bauen im Bestand, Fraunhofer IRB-Verlag, Stuttgart 2005 (<u>ISBN 3-8167-6691-9</u>)



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9.2 OTHER ADVISABLE WEB RESOURCES

- <u>EuroPHit project</u> Retrofitting for the energy revolution, one step at a time it is about applied knowledge on deep energy retrofits to the oft-overlooked yet critical area of step-by-step refurbishments. <u>Link</u>
- <u>3enCult</u> Efficient energy for EU cultural heritage The project 3ENCULT bridges the gap between conservation of historic buildings and climate protection, which is not an antagonism at all: historic buildings will only survive if maintained as living space. <u>Link</u>
- <u>Passipedia</u> The Passive House Resource Passipedia constitutes a vast array of cutting edge, scientifically sound, Passive House relevant articles. <u>Link</u>
- <u>PassREg</u> Solutions Open Source This Wiki database contains useful information supporting the local transition to zero energy construction. It provides an interactive, continually growing Solutions Open Source (SoS) on Passive House technology and compatible renewable energy supply. - <u>Link</u>
- <u>CasaClima</u> Refurbishment Energetic redevelopment using the most advanced technology reduces energy up to 90% compared to older buildings. Saving energy means saving money, but in addition also helps protect the environment and increases the cosiness of the home. -<u>Link</u>
- <u>Built2Spec</u> Built to Specifications is a Horizon 2020 EU-funded project involving 20 European partners that seeks to reduce the gap between a building's designed and as-built energy performance. - <u>Link</u>



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10. LIST OF ABBREVIATIONS

ACC	Agenzia Casa Clima
AEW	Azienda Energetica Etschwerke
BBT	Brenner Basistunnel
BOZ	City of Bolzano
CEN	European committee for Standardization
EIB	European Investment Bank
EURAC	European Academy of Bozen/Bolzano
G!E	Greenovate!Europe
IBK	City of Innsbruck
lig	Innsbrucker Immobilien Gesellschaft
IKB	Innsbrucker Kommunalbetriebe
IPES	Istituto per l'Edilizia Sociale
КРС	Kommunalkredit Public Consulting
MAG IBK	Magistrat Innsbruck
МоВ	Municipality of Bolzano
NHT	Neue Heimat Tirol
PHI	Passive House Institute
PUM	Urban Mobility Plan of Bolzano
PUT	Urban Traffic Plan
SAT	Standortagentur Tirol
SEAP	Sustainable Energy Action Plan
SEL	Società elettrica altoatesina SpA
TIGAS	TIGAS Erdgas Tirol GmbH
TIS	Techno Innovation South Tyrol KAG
TIWAG	Tiroler Wasserkraft AG
UIBK	Universität Innsbruck
WP	Work package
GUI	Graphical user interface
CMS	Content management system
SQL	Structured Query Language
RDBMS	Relational database management system
PHP	a server-side scripting language
PHPP	Passive House Planning Package



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high energy efficient, refurbishment, best practice

solutions, guideline, database, web resource

Annex: DOCUMENT INFORMATION

SINFONIA DELIVERABLE FACT SHEET					
PROJECT START DATE	1 June 2014				
PROJECT DURATION	60 months				
PROJECT WEBSITE	http://www.sinfonia-smartcities.eu				
DOCUMENT	I				
DELIVERABLE NUMBER:	4.1				
DELIVERABLE TITLE:	Guidelines to the pilots for decision				
DUE DATE OF DELIVERABLE:	Sept. 2016				
ACTUAL SUBMISSION DATE:	30.09.2016				
EDITORS:					
AUTHORS:	PHI and task 4.1 partners				
REVIEWERS:					
PARTICIPATING BENEFICIARIES:					
WORK PACKAGE NO.:	4				
WORK PACKAGE TITLE:	WORK PACKAGE TITLE: Integrated refurbishment processes coupling				
	electricity grids and heat/cold networks				
WORK PACKAGE LEADER:	SP				
WORK PACKAGE PARTICIPANTS:	SP, IKB, NHT, UIBK, BOZ, EURAC, IPES	5, ACC, PHI, LIE,			
	TIGAS, IIG				
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KEYWORDS: