EUROPEAN STRAWBALE GATHERING 2015 MONTARGIS | PARIS

LIFE CYCLE HABITATION

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GrAT Center for Appropriate Technology

RFCP RÉSEAU FRANÇAIS DE LA CONSTRUCTION PAILLE

Lifelong Learning Programme

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Life CH abitation cycle

Content

- GrAT
- Strategies
  - Straw bales and S-House
  - Innovative constructions
  - Energy concept
- Life Cycle Habitation

GrAT TU WIEN KOMMUNAL KREDIT PUBLIC CONSULTING Life

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Life CHabitation Cycle

GrAT – Center for Appropriate Technology

Headquarter
at
TU Vienna

Branch office in
Böheimkirchen, NÖ, Austria

Branch office in
Manila, the
Philippines

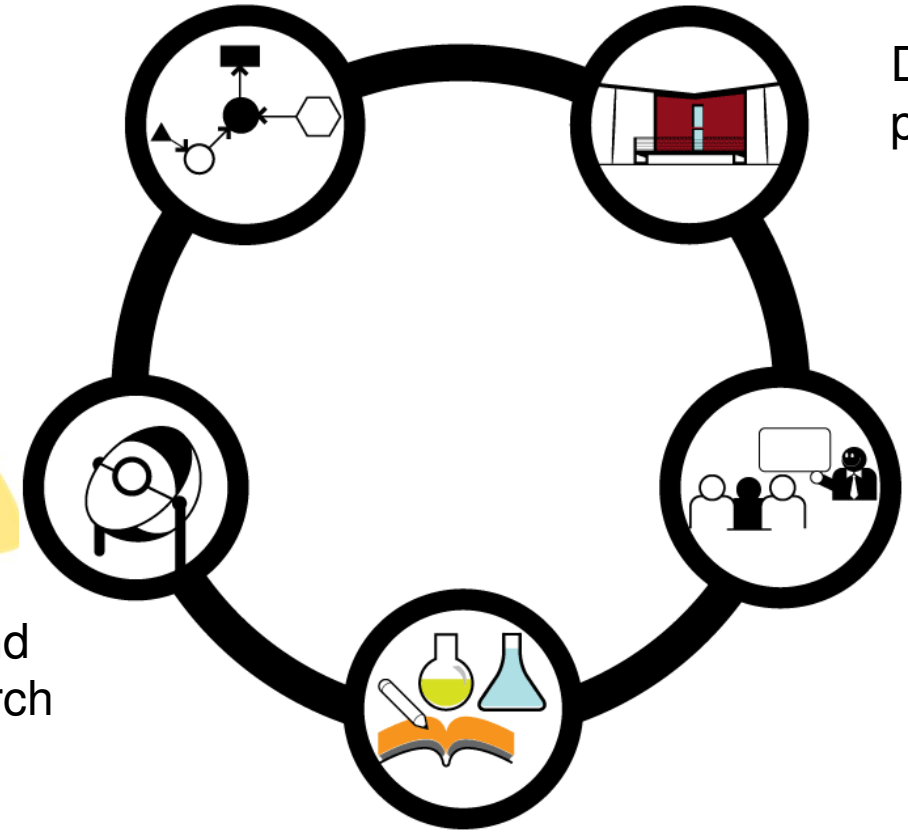
Branch office in
Kathmandu, Nepal

GrAT | TU WIEN | KOMMUNAL KREDIT PUBLIC CONSULTING | Life

GrAT – Center for Appropriate Technology

Strategy development

Demonstration projects



Product development and industrial research

Dissemination and teaching

Basic research

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Expertise & key projects

Renewable-based materials

Straw bale insulation

Bio-polymer

Bio-composite

Sustainable building

Straw bale building "S-House"

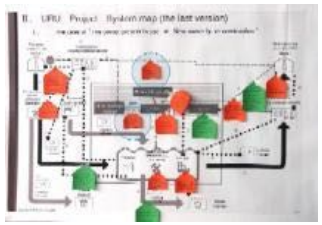
Zero Carbon Village

Renewable energy

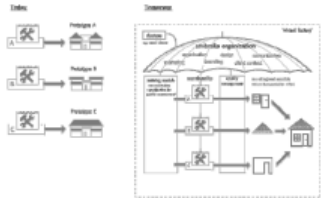
Energy self sufficiency "Zero Carbon Resorts"

"Zero CO2 Cooler"

System solutions for sustainability



Product Service Systems (PSS) for green business



"Virtual Factory"

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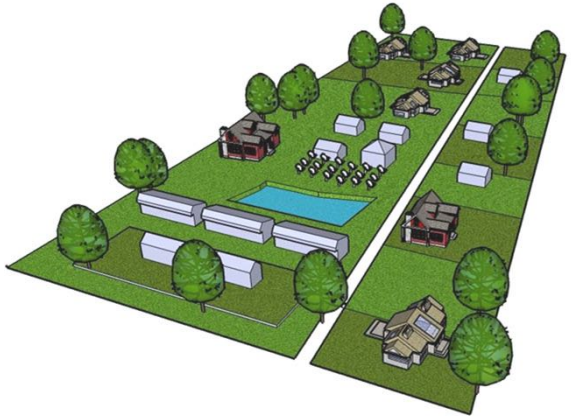
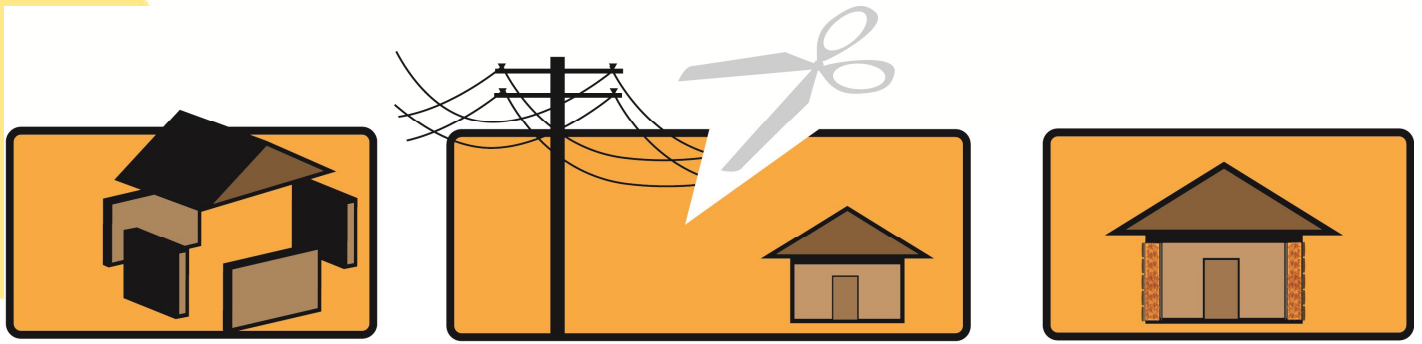
New project:

Life Cycle Habitation



LIFE+ Environment Policy and Governance



Modular prefabrication

Energy self-sufficient

Sust. building materials

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S-HOUSE: Office- and exhibition building

Das Land Steiermark

STENUM

bmvit

HAUS der Zukunft

WKO

オーストリア

AUSTRIA | EXPO 2005 | AICHI JAPAN

Building procedures/key innovations

Extraction of clay plaster

Footing

Ventilated base plate

Wooden wall construction

Membrane roof

Straw bale wall construction

Clay plaster

Wooden exterior wall

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Treeplast screw

- Injection moulded
- Biopolymer
- Straw bale layer mounting
- 100% biodegradable
  (not by water)
- made of wood-based material
  (lignine)

WOOD instead of METAL

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Overall concept

- Consistent use of renewable resources
- New developed fastening system
- Demolition concept
- Possibility for re-use and recycling
- High thermal insulation
- Optimized system for pipes and wires
- Biomass back-up stove
- Natural colours
- Efficient control system
- Granite floor as thermal storage
- Solar collectors for domestic hot water
- .....

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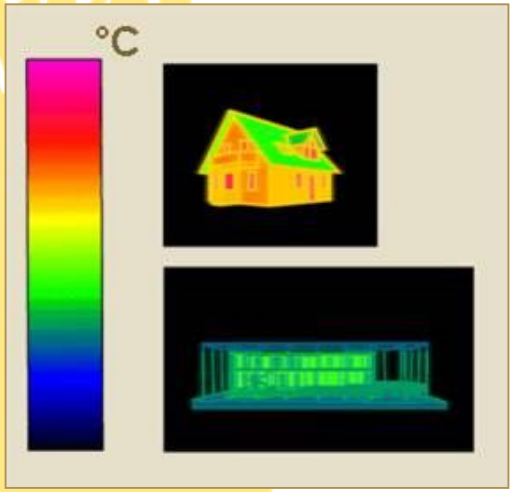
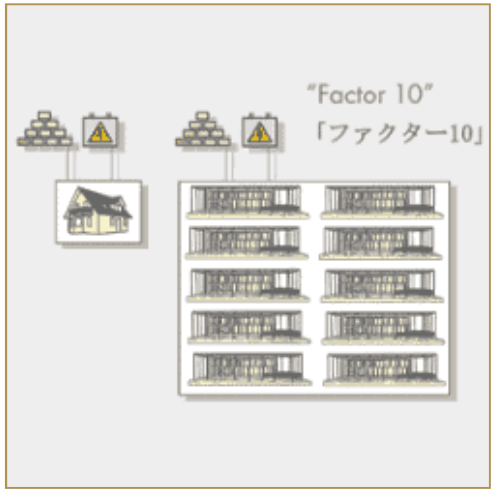
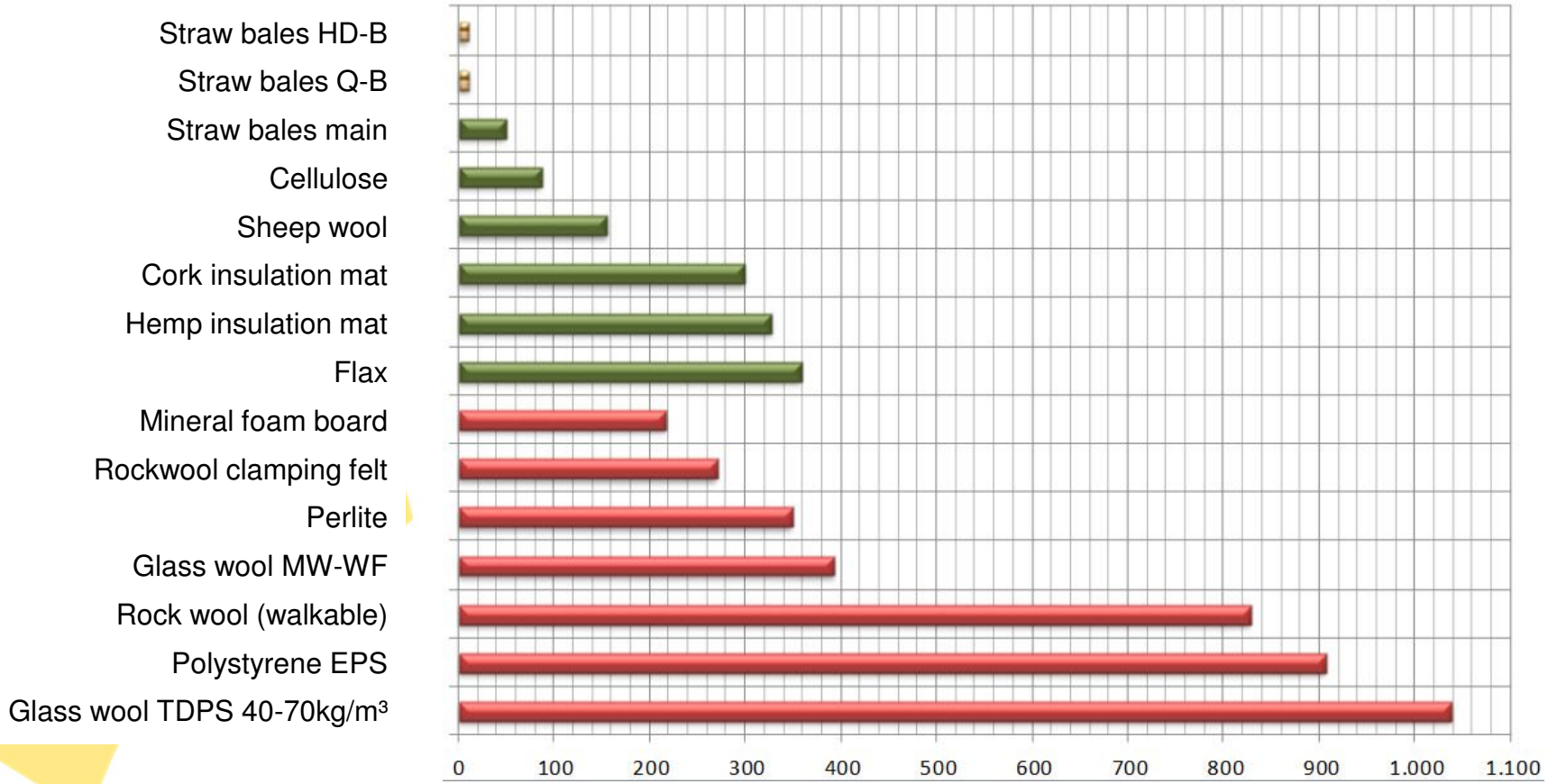
Passive house (Factor 10+)





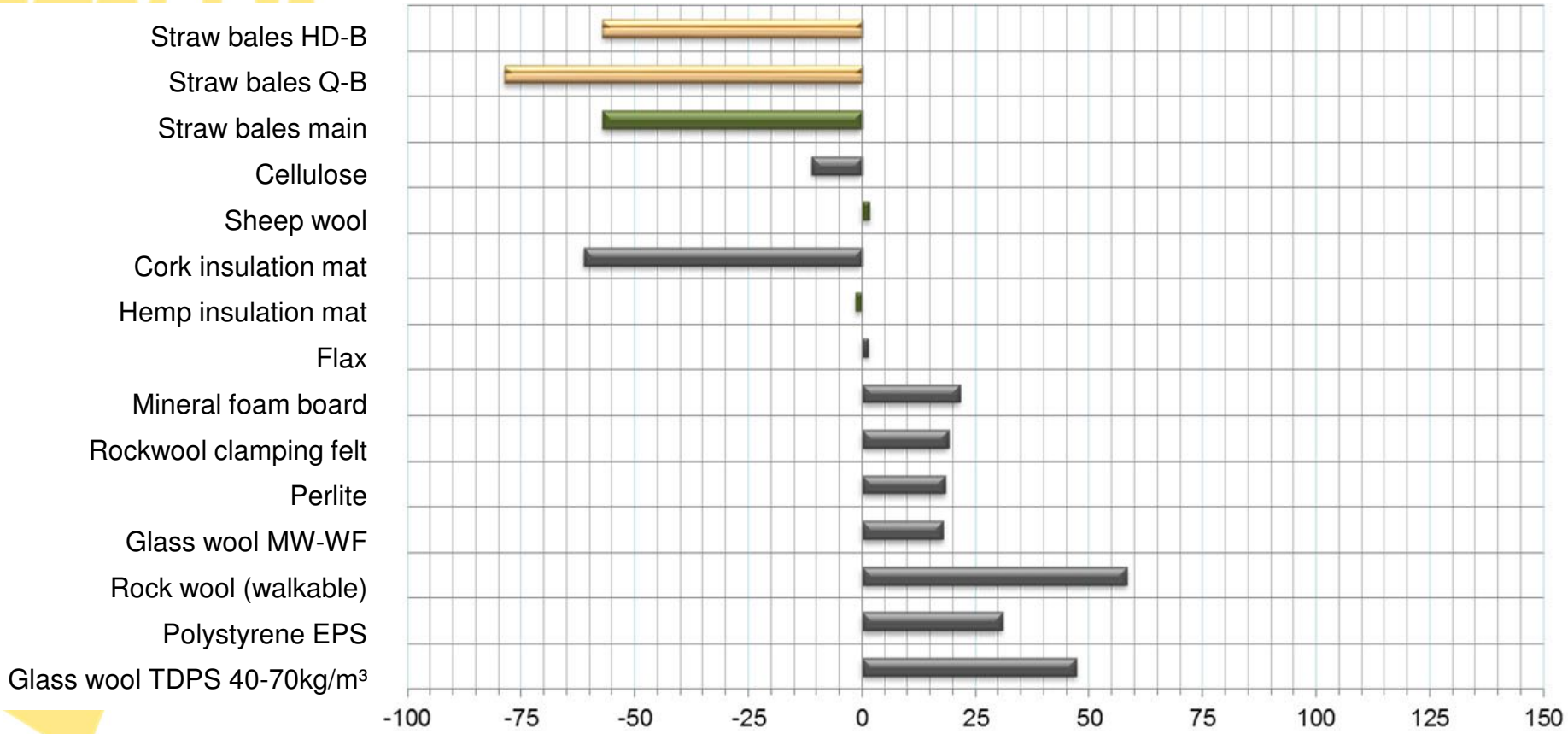
- Reduction of energy and materials consumption
- Promotion of the use of renewable energy sources
- Consideration of user comfort
- Improvement of quality of life in the region
- Comparable costs to those of conventional building construction

PEI – Primary Energy Input, non renewable



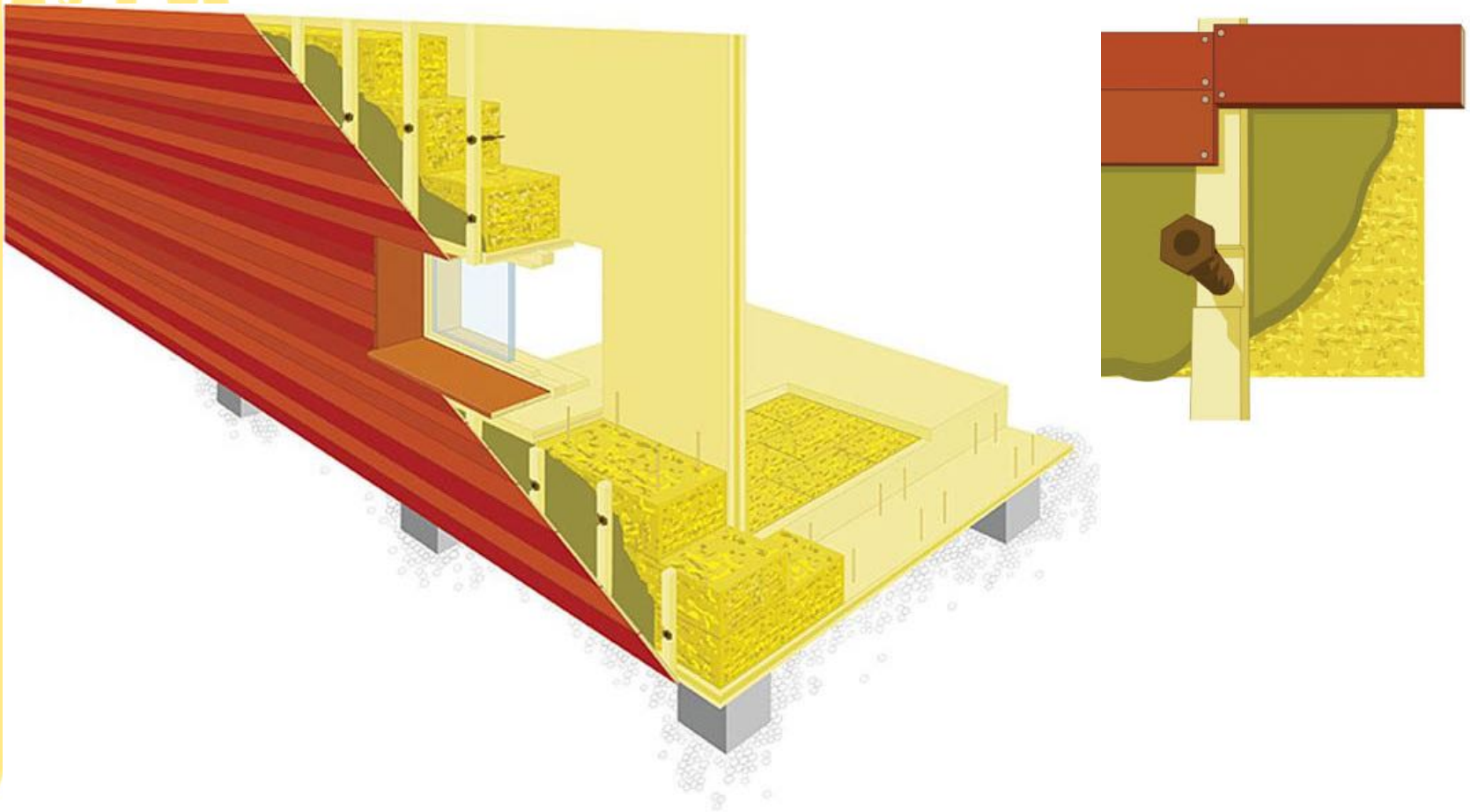
PEI in MJ/m² (referred to a heat transfer resistance of 8.75 m²K/W)

GWP – Global Warming Potential



GWP - Global Warming Potential kg CO2eq/m² (referred to a heat transfer resistance of 8.75 m²K/W)

Innovative constructions



Wall structure and fixing – S-House

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Recycling strategy

Wood-straw wall construction	Useful life	Composting	Product recycling	Material recycling	Thermal utilization	Disposal	Additives	Regional
CLT-wood	100	no	re-use	further use -> e.g. chipboards	yes - 18 MJ/kg	possible after thermal pre-treatment	very small proportion of binder materials (PUR adhesive)	yes
straw bales	50	yes (after opening)	re-use (if necessary cutting/tying -> insulation material)	further use (opening, if necessary baling) -> straw bales, fertilizer, bedding	yes - 17,5 MJ/kg	possible after thermal pre-treatment	thread (hemp, sisal, PP)	yes
clay plaster	100	yes (if only natural additives)	re-use (moistening with water, cleaning -> clay plaster)	further use (moistening with water) -> new clay products	not possible	disposal category 3 possible (but usually composting)	hemp, flax etc. possible	yes
wooden laths (timber, planed, tech. dried)	60	yes	re-use	further use -> e.g. chipboards	yes - 18 MJ/kg	possible after thermal pre-treatment	-	yes
wooden fasade (timber, rough, air dry)	60	yes	re-use	further use -> e.g. chipboards	yes -18 MJ/kg	possible after thermal pre-treatment	-	yes

Modular prefabrication

- „Straw hotel“, Nax, Switzerland
- Prefabricated wall elements
- Mounting of insulation layer in factory
- Interior finish on construction site

Zero Carbon Village project

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Modular mass production

- „Straw hotel“ – sleeping rooms
- Prefabricated modular units
- Housing technology completely integrated
- Mounting of straw bales on construction site

ZCV project

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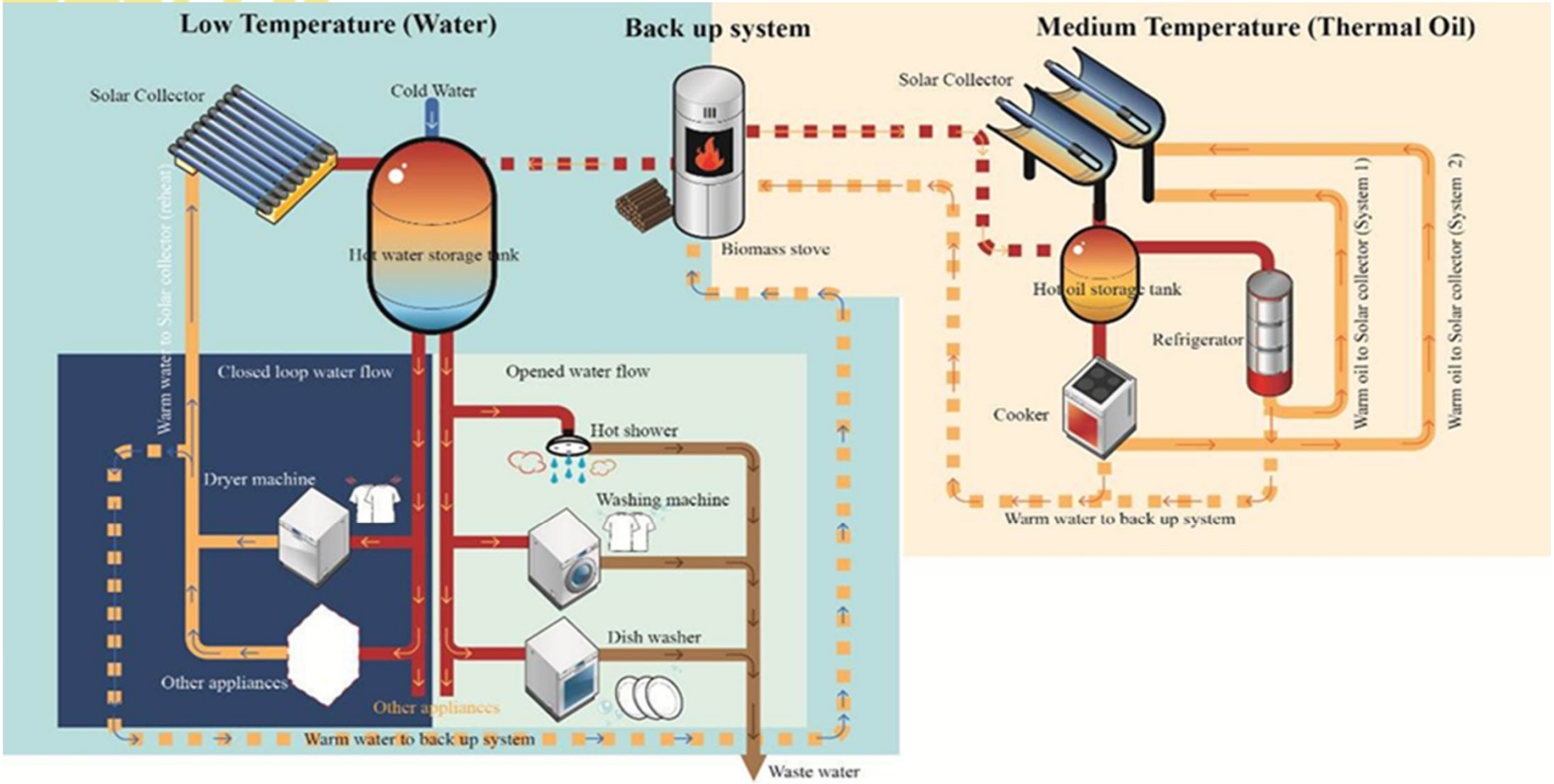
Energy concept



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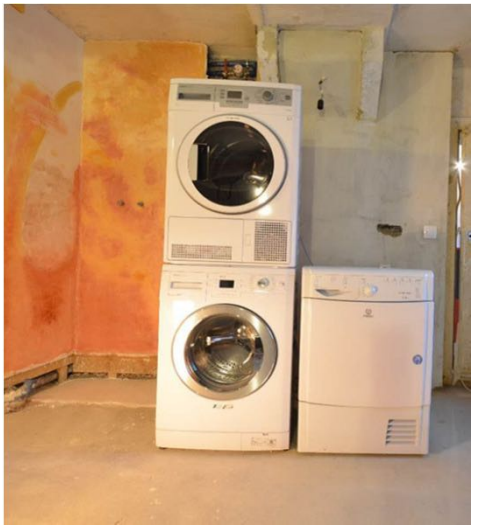
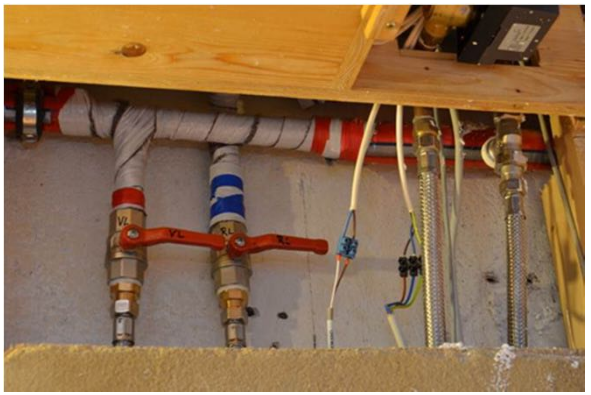
Low temperature system

Open loop:
- Washing machine
- Dishwasher

Closed loop
- Tumble dryer
- Hair dryer

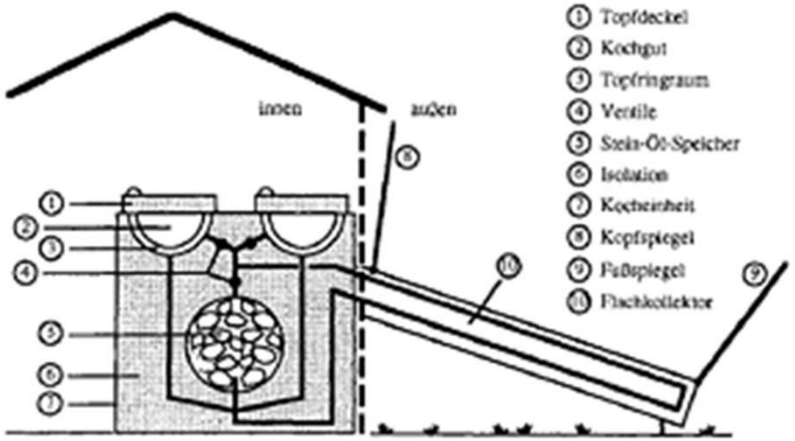
Monitoring system





Medium temperature – solar cooker

- Prototype for community centre
- Concept of Prof. Schwarzer,
  Solar institute Jülich, Germany
- Thermo-syphon operation
- Stone-oil heat storage



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Energy consumption

Table 1: energy consumption and saving potentials in Austrian households through LCH energy concept

electric loads in households	Median*	electricity LCH	electricity reduction to	thermal energy LCH (excl. heating)
	kWh/a	kWh/a	%	kWh/a
hot water heating	1612	0	0%	1612
recirculation pump	347	347	100%	0
freezer	329	0	0%	189
lighting	298	149	50%	0
cooking devices	291	29	10%	0
cooling devices	263	0	0%	167
dishwasher	222	50	22%	115
heating incl. operating energy	220	10**	5%	6 kWh/m^{2}a***
dryer	178	50	28%	264
washing machine	175	40	23%	126
total	**3934 kWh**	**675 kWh**	**17%**	**2473 kWh**

* data source: Statistik Austria
** ventilation system with heat recovery, not universally valid
*** calculated energy demand for heating of the S-House

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Site plan

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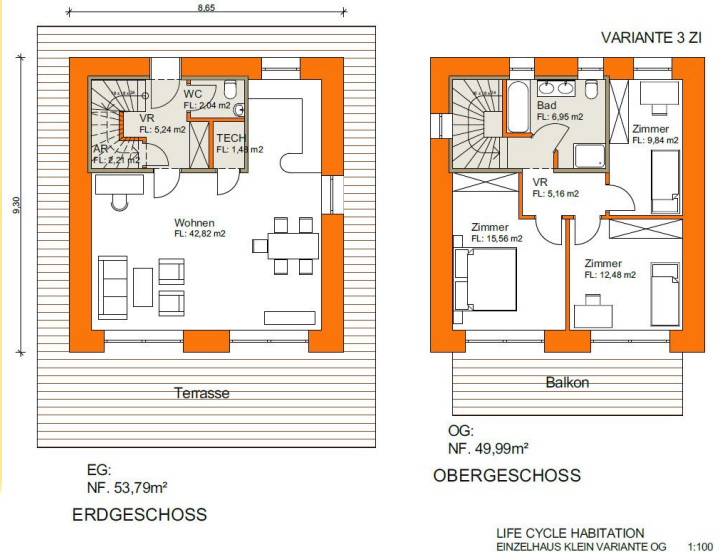
Building types

- Community centre
- Apartments
- Townhouses
- Compacted flat-roof buildings



EG:
NF. 53,79m²
ERDGESCHOSS

OG:
NF. 49,99m²
OBERGESCHOSS

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EINZELHAUS KLEIN VARIANTE OG 1:100

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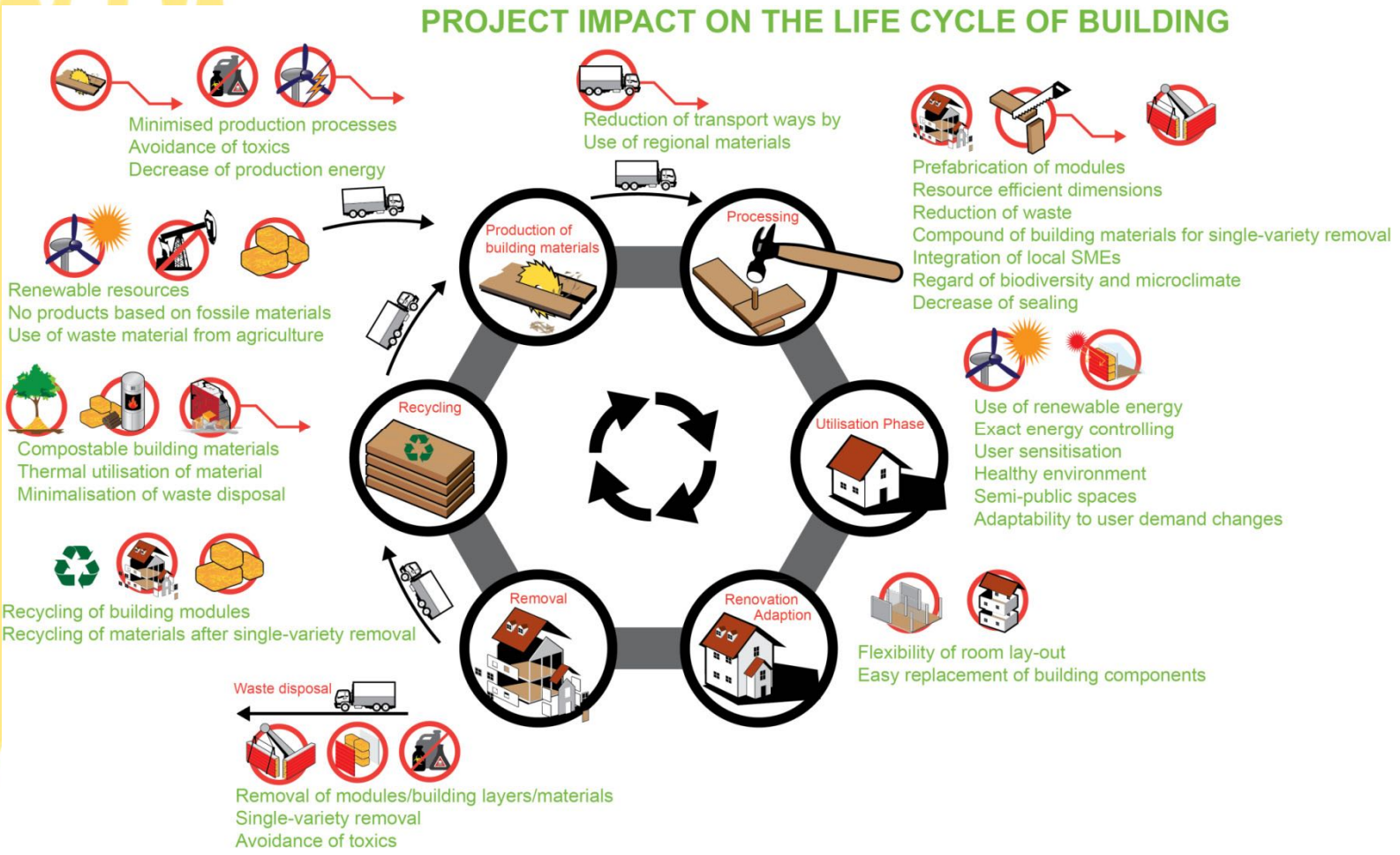
Project time plan

Project duration: 51 month

Action numbe	Name of the action	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
A. Preparatory actions:																									
A.1	Innovationsentwicklung		■	■	■	■																			
A.2	Architektonische Entwurfsplanung			■	■																				
B. Implementation actions:																									
B.1	Einreichung der Prototypengebäude.				■	■																			
B.2	Technische Ausführungs- und Detailplanung der Prototypengebäude					■	■	■																	
B.3	Grundlegende Infrastrukturanbindung					■	■																		
B.4	Ressourceneffiziente Fundamenterrichtung								■		■														
B.5	Hochbau - vorgefertigte Modulbauweise									■	■	■	■	■	■										
B.6	Hochbau - lasttragende Bauweise									■	■	■	■	■	■										
B.7	Innovatives Energieversorgungssystem									■	■	■	■	■	■	■	■								
C. Monitoring of the impact of the project actions:																									
C.1	Monitoring - Energieverbrauch								■	■	■	■	■	■	■	■	■	■	■						
C.2	Monitoring - Ressourcenverbrauch					■	■	■	■	■	■	■	■	■	■										
C.3	Qualitätssicherungsmaßnahmen							■	■	■	■	■	■	■											
D. Communication and dissemination actions:																									
D.1	Projekt-Webseite		■	■		■	■		■	■		■	■		■	■		■	■	■					
D.2	Life+ Informationstafeln					■									■										
D.3	Teilnahme an Konferenzen, Präsentationen			■					■				■				■								
D.4	Fachartikel			■		■			■		■		■				■								
D.5	Informations- und Disseminationsmaterial			■			■		■		■	■	■	■			■		■	■					
D.6	Öffentlichkeitsarbeit			■	■		■		■	■	■	■	■	■	■		■		■	■					
D.7	LIFE Cycle Habitation Experience Laboratory															■	■	■	■	■					
D.8	Laienbericht																		■	■					
D.9	Policy Suggestions			■	■				■				■						■	■					
E. Project management and monitoring of the project progress:																									
E.1	Projektmanagement		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					

Life CH Habitation Cycle

Life cycle



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Thank you for your attention!

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