



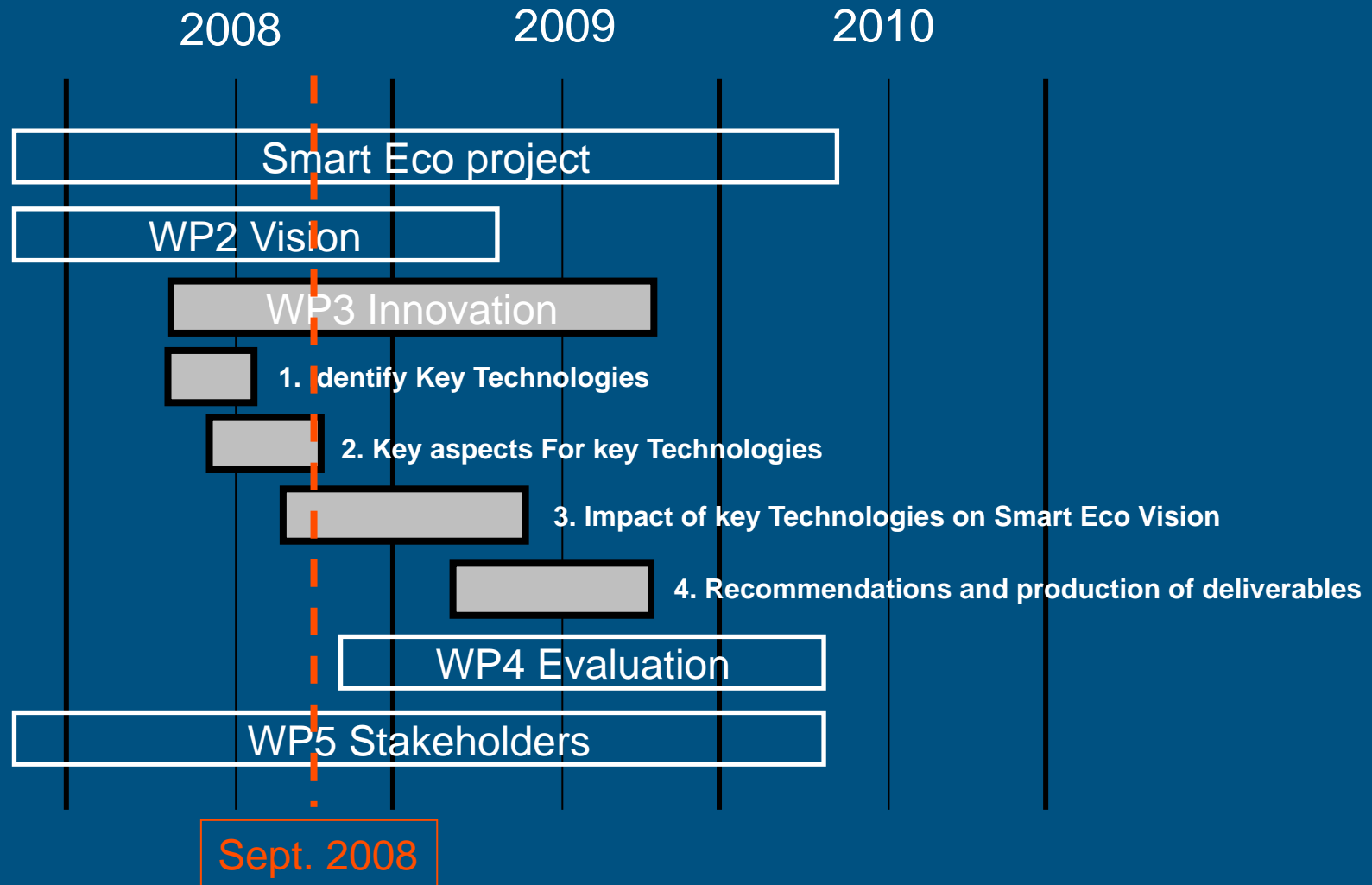
SMART-ECO – WP3

Intermediate meeting, Grenoble, Sept 29 '08

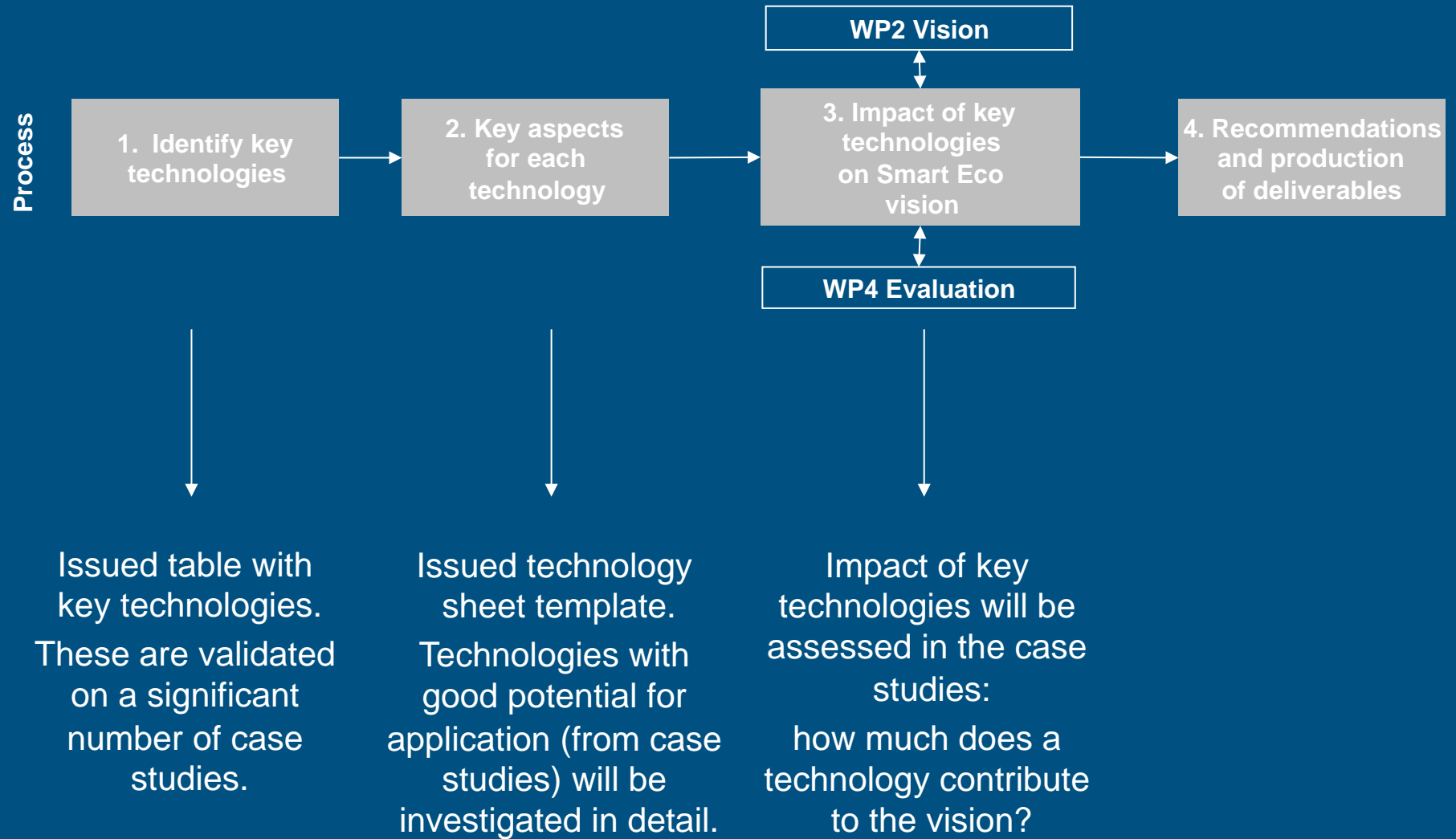
Marco Imperadori, Gabriele Masera, Giuliana Iannaccone

Programme

WP3 Duration: 18 months from April 08 to October 2009



Current status



Case studies

Potential key technologies are tested against the case studies.

State-of-the-art projects will help identify areas of innovation.

		1. Primary school, La Tour - France	2. Primary school, Empoli - Italy	3. High school, St Oisant de Ryliere - France	4. Targa school, Rilkenberg-Sweden	5. Great Nobby School, Braintree - England	6. Gerhard Muller Schule, Eberbach - Germany	7. Educational Office Building, Southampton, UK	8. Energie Forum, Berlin, Germany	9. Finnish Forest Research Institute, Joensuu - Finland	10. County Hall Alice, Strasbourg - France	11. Centre of Nature, Los Plaines de Son, Lleida - Spain	12. Santia-BUPA, Madrid - Spain	13. National Centre of Renewable Energies (CENER), Navarra - Spain	14. Villa Italo, Ecopostolle, Bi Escorial - Spain	15. Building of a youth crisis center, Lodi - Italy	16. Primary Health Care Center, Barcellona - Spain	17. Mercator Center, Lubiana - Slovenia	
Renewable Energy Generation	Wind Energy	Large horizontal axis turbine (on/off shore)																	
		Small horizontal axis turbines																	
		Small vertical axis turbines																	
	Solar Thermal	Solar water heating system																	
		Parabolic trough power plants																	
		Linear Fresnel reflector power																	
		Parabolic dish																	
		Tower towers																	
	Photovoltaics	Solar Fluo																	
		Solar Cooling																	
Earth Energy systems	Crystalline silicon solar cells	X	X			X	X	X			X	X			X	X	X		
	Thin film solar cells																		
	Electrochemical solar cells																		
	PV cladding systems													X					
Biomass	Geothermal heating						X	X											
	Ground water (aquifers)											X							
	Ground coupled heat pump																		
Waste	Ground coupling using air																		
	Surface water cooling (lake, river, sea)																		
	Solid biomass fuels													X					
Energy Saving and efficiency	Passive Solar	Biogas																	
		Bi-oil																	
	Passive Cooling	Bi-cheat																	
		Landfill gas																	
		Sewage																	
	Orientation	Solid waste																	
		Direct solar gain						X											
	Insulation	Indirect solar gain				X													
		Trombe wall													X				
		Shading systems	X			X		X	X	X					X	X	X		
Natural ventilation			X	X			X				X		X	X	X	X			
Ventilated facade											X								
Lighting	Passive cooling strategies / devices			X					X					X					
	Green roofs/walls				X						X				X				
Water	Night flushing of mass																		
	S/N Building orientation		X									X	X	X	X				
Materials	S/V ratio																		
	Thermal insulation <= 0,3 W/m²K						X		X	X				X	X				
Operation	Thermal mass							X											
	Facade systems																		
Water	Vacuum insulation panels		X																
	Reinforced plastics for heat storage																		
Lighting	Phase change materials																		
	Lighting systems		X	X	X						X	X	X		X	X	X		
Materials	Use of day lighting																		
	Glass Technology																		
Water	Water conservation						X	X					X	X	X	X			
	Rainwater harvesting/greywater	X					X	X					X	X	X				
Materials	High performance steel																		
	High performance concrete												X	X					
Operation	Advanced composite materials						X						X	X	X				
	Reuse and recycling of building materials						X	X	X					X	X				
Energy Saving and efficiency	Automation / controls for energy saving								X							X			
	Building Management system	X														X	X	X	
	Air quality control sensors						X									X	X		
	Intelligent lighting															X	X		
	Post occupancy monitoring																		
Energy Saving and efficiency	Waste management plan																		
	Daylight dependent control systems																		

80 Case studies (Sept. 2008)

Examples mix climatic areas, function and new construction vs. refurbishment.
Need input from some countries.



CLASSI TIPOLOGICHE INDIVIDUATE



1.A. NEW: SINGLE HOUSE	2.A. REF: SINGLE HOUSE
1.B. NEW: OFFICE	2.B. REF: OFFICE
1.C. NEW: SCHOOL	2.C. REF: SCHOOL
1.D. NEW: HOUSING	2.D. REF: HOUSING
1.E. NEW: PUBLIC BUILDINGS	2.E. REF: PUBLIC BUILDINGS

	BUILDING	WHERE	WEB / BIBLIOGRAPHY	TIPOLOGY
1	Primary school	La Tour - France	http://www.sara-project.net/	2.A. REF: SINGLE HOUSE
2	Primary School	Empoli - Italy	http://www.acca.it/euleb/it/home/index.html	1.C. NEW: SCHOOL
3	High school -	St Clément de Rivière - France	http://www.acca.it/euleb/it/home/index.html	1.C. NEW: SCHOOL
4	Tanga School	Falkenberg - Sweden	http://www.acca.it/euleb/it/home/index.html	1.C. NEW: SCHOOL
5	Great Notley School	Braintree - England	http://www.acca.it/euleb/it/home/index.html	1.C. NEW: SCHOOL
6	Gebhard - Muller Schule	Biberach - Germany	http://www.acca.it/euleb/it/home/index.html	1.C. NEW: SCHOOL
7	Educational Office Building	Southampton - UK	http://www.sara-project.net/	1.C. NEW: SCHOOL
8	Energie Forum	Berlin - Germany	http://www.acca.it/euleb/it/home/index.html	2.B. REF: OFFICE
9	Finish Forest Research Institute	Joensuu - Finland	http://www.acca.it/euleb/it/home/index.html	1.B. NEW: OFFICE
10	County Hall Alsace	Strasbourg - France	http://www.acca.it/euleb/it/home/index.html	1.B. NEW: OFFICE
11	Centre of Nature Les Planes de Son	Lleida - Spain	http://www.acca.it/euleb/it/home/index.html	1.B. NEW: OFFICE
12	Sanitas-BUPA	Madrid - Spain	http://www.acca.it/euleb/it/home/index.html	1.B. NEW: OFFICE
13	National Centre of Renewable Energies (CENER)	Navarra - Spain	http://www.acca.it/euleb/it/home/index.html	1.B. NEW: OFFICE
14	Villetta ecocompatibile	El Escorial - Spagna	http://assa-cee.org/home.htm	1.A. NEW: SINGLE HOUSE
15	Building of a youth crisis center	Lodi - Italy	-	1.A. NEW: SINGLE HOUSE
16	Primary Health Care Center	Barcelona - Spain	http://www.sara-project.net/	1.E. NEW: PUBLIC BUILDINGS
17	Mercator Center	Lubiana - Slovenia	http://www.sara-project.net/	1.E. NEW: PUBLIC BUILDINGS

18	Nursing Home and Centre for Senior Citizens	Steinfeld - Austria	Detail, 47 serie 2007 - 6..... (*1)	1.E. NEW: PUBLIC BUILDINGS
19	Dwellings for senior Citizens	Domat - Switzerland	Detail, 47 serie 2007 - 6.....	1.E. NEW: PUBLIC BUILDINGS
20	Administrative Headquarters of the Rijkswaterstraat	Middelburg - Amsterdam - Netherlands	Detail, 47 serie 2007 - 6.....	1.B. NEW: OFFICE
21	Secondary school	Brixlegg - Austria	Detail, 47 serie 2007 - 6.....	1.C. NEW: SCHOOL
22	Passive - Energy Standard Housing	Salzburg - Austria	Detail, 47 serie 2007 - 6.....	1.A. NEW: SINGLE HOUSE
23	Community Centre	Ludesch - Austria	Detail, 47 serie 2007 - 6.....	1.E. NEW: PUBLIC BUILDINGS
24	Passive school	Laion-Novale (Bolzano) - Italy	Detail, 47 serie 2007 - 6.....	1.C. NEW: SCHOOL
25	Design Office	Enschede - Netherlands	Detail, 45 serie 2005 - 6..... (*2)	1.B. NEW: OFFICE
26	Single Family House	Feldkirch - Austria	Detail, 45 serie 2005 - 6.....	1.A. NEW: SINGLE HOUSE
27	House	Hegenlohe - Germany	Detail, 45 serie 2005 - 6.....	1.A. NEW: SINGLE HOUSE
28	Scout's Hotel	Ludesch - Austria	Detail, 45 serie 2005 - 6.....	1.E. NEW: PUBLIC BUILDINGS
29	Workshop for Disabled People	Lindenberg - Germany	Detail, 45 serie 2005 - 6.....	1.E. NEW: PUBLIC BUILDINGS
30	Information, Communication and Media Center	Cottbus - Germany	Detail, 45 serie 2005 - 6.....	1.E. NEW: PUBLIC BUILDINGS
31	Attic Renovation	Munich - Germany	Detail, 46 serie 2006 - 11..... (*3)	2.A. REF: SINGLE HOUSE
32	House at a Lake	Kaufbeuren - Germany	Detail, 46 serie 2006 - 11.....	2.A. REF: SINGLE HOUSE
33	Apartment House	London - England	Detail, 46 serie 2006 - 11.....	2.D. REF: HOUSING
34	Overhaul of Residential Complex	Heumatt - Zurich - Switzerland	Detail, 46 serie 2006 - 11.....	2.D. REF: HOUSING
35	Remodelling of a Senior centre	Magdeburg - Germany	Detail, 46 serie 2006 - 11.....	2.E. REF: PUBLIC BUILDINGS
36	Retirement Home	Landeck - Austria	Detail, 46 serie 2006 - 11.....	2.E. REF: PUBLIC BUILDINGS
37	Hotel and Tourism Institute	Montreal - France	Detail, 46 serie 2006 - 11.....	2.B. REF: OFFICE
38	Factory Conversion	Rehau - Germany	Detail, 45 serie 2005 - 6.....	2.B. REF: OFFICE
39	Wasgening School	Basel - Switzerland	Detail, Pratices.. (*4)	2.C. REF: SCHOOL
40	Terrace House	Zurich - Switzerland	Detail, Pratices..	2.D. REF: HOUSING
41	Office Building	Zurich - Switzerland	Detail, Pratices..	2.B. REF: OFFICE
42	Nursery School	Ulm - Germany	Detail, Pratices..	2.C. REF: SCHOOL
43	Point-block	Ingolstadt - Germany	Detail, Pratices..	2.D. REF: HOUSING
44	Prefabricated panel block	Leinefeld - Germany	Detail, Pratices..	2.D. REF: HOUSING
45	Semi-detached houses	Kriens - Switzerland	Energy-Efficient architecture... (*5)	1.D. NEW: HOUSING
46	Multy-family house	Munich - Germany	Energy-Efficient architecture...	1.D. NEW: HOUSING
47	Office and residential building	Munich - Germany	Energy-Efficient architecture...	1.B. NEW: OFFICE
48	Office and residential building	Wiesbaden - Germany	Energy-Efficient architecture...	1.D. NEW: HOUSING
49	Residential building	Madrid - Spain	Energy-Efficient architecture...	1.D. NEW: HOUSING
50	Student residence	Wuppertal - Germany	Energy-Efficient architecture...	1.D. NEW: HOUSING
51	Office and residential building	Sursee - Switzerland	Energy-Efficient architecture...	1.B. NEW: OFFICE
52	Office complex	Duisburg - Germany	Energy-Efficient architecture...	1.B. NEW: OFFICE
53	Office building	Munich - Germany	Energy-Efficient architecture...	1.B. NEW: OFFICE
54	Office complex	Wiesbaden - Germany	Energy-Efficient architecture...	1.B. NEW: OFFICE
55	Parliament building	London - England	Energy-Efficient architecture...	1.B. NEW: OFFICE
56	Office and workshops	Weidling - Germany	Energy-Efficient architecture...	1.B. NEW: OFFICE
57	commercial building	Steyr - Austria	Energy-Efficient architecture...	1.E. NEW: PUBLIC BUILDINGS
58	School complex	Pichling - Austria	Energy-Efficient architecture...	1.C. NEW: SCHOOL
59	School	Aufkirchen - Germany	Energy-Efficient architecture...	1.C. NEW: SCHOOL
60	Comprehensive school	Gelsenkirchen - Germany	Energy-Efficient architecture...	1.C. NEW: SCHOOL

61	Atika (VELUX)	Spain		1.A. NEW: SINGLE HOUSE
62	Solar Decathlon TU Darmstadt	Germany		1.A. NEW: SINGLE HOUSE
63	Casa Rubner (Heide, Flora, Montemiele)	Italy		1.A. NEW: SINGLE HOUSE
64	Casa Imi - Traina- Vanoncini (Atelier2)	Italy		1.A. NEW: SINGLE HOUSE
65	Solartag (VELUX)	Denmark		1.A. NEW: SINGLE HOUSE
66	Stezzano - Vanoncini (Atelier2)	Italy		1.D. NEW: HOUSING
67	Colognola - Vanoncini (Atelier2)	Italy		1.D. NEW: HOUSING
68	Chignolo - Vanoncini (Brandolini - Valdameri)	Italy		1.D. NEW: HOUSING
69	ITC Einaudi (Atelier2 + uff. tecnico provincia di Brescia)	Chiari (Brescia) Italy		1.C. NEW: SCHOOL
70	Uffici VELUX (White Design)	Kettering - UK		1.D. NEW: HOUSING
71	Uffici GR Informatica (studio AIACE)	Lecco - Italy		1.B. NEW: OFFICE
72	BIRD : casa per anziani a Brescia (studio AIACE)	Brescia - Italy		1.E. NEW: PUBLIC BUILDINGS
73	Scuola via Brivio (studio AIACE)	Milano - Italy		1.D. NEW: HOUSING
74	The Lighthouse, Sheppard Robson	UK		1.A. NEW: SINGLE HOUSE
75	Bill Dunster	UK		1.D. NEW: HOUSING
76	National trust HQ, Feilden Clegg Bradley	UK	Arketipo - giugno 2006	1.D. NEW: HOUSING
77	Ecobox	Madrid - Spain		1.B. NEW: OFFICE
78	Type-A (i3d)	Milano - Italy		1.D. NEW: HOUSING
79	Pregnana Milanese (Trivelli + EPTA)	Italy		1.D. NEW: HOUSING
80	Edificio per uffici	Melbourne - Australia	Arketipo - giugno 2006	1.B. NEW: OFFICE

49 Residential building
Madril - Spain
I.E. NEW: HOUSING 2004

- Social housing project
- Bioclimatic design
- Parking underground with natural light
- Shading and natural ventilation in summer
- Collectors and gas-operated boiler for warm-water (70% of the total warm water)
- Heating provided by a central gas boiler, radiators for distribution, system computer-monitored
- U wall: 0,43/0,58/0,77 W/m²K
- U windows: 2,18 W/m²K
- EP_w: 62,52 kWh/m²y



50 Student residence
Wuppertal - Germany
I.E. NEW: HOUSING 2000/2003

- Bioclimatic design
- Low energy house/ passive house standard
- Certified passive windows
- Airtight joints
- Controlled ventilation
- Monitoring process for 3 years by university
- U windows: 1,56/0,82 W/m²K
- EP_w: 68,1/15 kWh/m²y



51 Office and residential building
Sursee - Switzerland
I.B. NEW: OFFICE 2002

- Prefabricated wood construction
- Total construction time: 8 months
- Façade designed with wood cladding
- Protection from sound (façade solution with 2 gypsum board panels)
- Attention for materials used
- Heat recovery
- Heat pumps for heating energy requirement and to provide hot water
- Floor heating
- U wall: 0,18 W/m²K
- U windows: 1,25 W/m²K
- EP_w: 24,4 kWh/m²y



New construction

Single family dwellings 11

Housing 14

Offices 18

Schools 12

Public 9

45 Semi-detached houses
Kriens – Switzerland
I.E. NEW: HOUSING 2001

- Bioclimatic design
- Timber superstructure prefabricated and plinth of reinforced concrete
- Ventilation linked to a heat recovery
- Heat pipe, which pre-warm the outside air
- U wall: 0,105 W/m²K
- U windows: 0,94 W/m²K
- EP_h: 23,6 kWh/m²y



46 Multi-family house
Munich - Germany
I.E. NEW: HOUSING 2001

- Bioclimatic design
- Design for wheelchair access
- Concrete skeleton structure
- Steel balconies suspended from walkways
- Rooms equipped with door-height tube radiators
- 52 mq of collectors above balconies
- Installation for rainwater collection (for lavatories and irrigation)
- Floor ventilation ducts for garages
- U wall: 0,24 W/m²K
- U windows: 1,1 W/m²K
- EP_h: 46,5-49,9 kWh/m²y



47 Office and residential building
Munich - Germany
I.B. NEW: OFFICE 2004

- Bioclimatic design
- First project which employ vacuum insulating panels
- CHPP (natural gas-operated Combined Heating and Power Plant)
- Windows with triple-glazed
- Ventilation system with heat recovery
- Future plans for photovoltaic system
- Use of groundwater for cooling
- U wall: 0,13 W/m²K
- U windows: 0,7 W/m²K
- EP_h: 20 kWh/m²y



Refurbishment

Single family dwellings 3

Housing 5

Offices 4

Schools 2

Public 2

Bnwn - EOO - WbD Innovation
Evaluation form

61

SCHOOL COMPLEX - PICHLING, AUSTRIA -

1. General information about the building

1.1. Project team:

- Architects: Loudon & Hablitzl, Vienna
- Planning technical building system: Althom Engineering, Baden
- Load-bearing structure: Anton Hamer, Krams/Vienna

1.2. Completion:

2003

1.3. Geometrical data:

- number of floors: 2
- NFA: 5015 m²
- GFA: 5901 m²
- GRV: 27351 m³

1.4. Description:

The school complex, with excellent linkages to public transportation, is included in a project which encompasses 1317 residential units complemented by community buildings and a kindergarten. The school is situated in generous grounds that provide sufficient space for expansion, sports and leisure activities. It consists of a two-story wing with classrooms and common rooms for daycares. The gym at the front has been lowered into the ground and has an underground link to the main building. A planned second construction phase will add a comprehensive school for twelve grades with a triple gym. An access atrium with daylight from above links the daycare rooms on the ground floor and the primary school classrooms on the second floor in a natural and pleasant manner. The roof area is in part accessible and offers an opportunity for classes to be held outside, weather permitting. The rest of the roof is densely planted. The large open area on the east side, which merges with the natural landscape along the creek, is especially attractive and ideal for a school setting.



Site plan, not to scale



Ground floor of school and gym, not to scale



Upper floor, not to scale

Printing date: 28/09/2008

1

Bnwn - EOO - WbD Innovation
Evaluation form

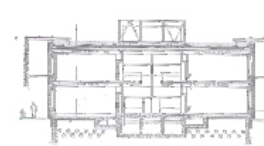
Energy performance

2.1. Thermal transmittance values

- U-value roof: 0.15 W/m²K
- U-value wall: 0.17 W/m²K
- U-value window: 0.19 W/m²K
- U-value ground floor: 0.6 W/m²K
- U-value window: 1.1 W/m²K

2.2. Final energy requirement

- EPH: 34.8 kWh/m²y



Section with key construction components, not to scale

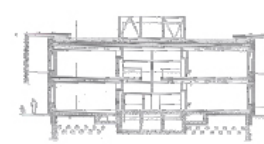
Energy saving efficiency and environmental impact

3.1. Passive solar heating:

- suspended adjustable sunshade louvers on the longitudinal facades which allow passive solar gain in winter

3.2. Passive cooling

- economic, continuous night-time ventilation in summer
- suspended adjustable sunshade louvers which avoid heat gain



Section with key construction components, not to scale

3.3. Materials

The colour and material concept continues the principle of conscious reduction and the use of clear, robust surfaces:

- terrazzo in the hallways
- parquet flooring in the classrooms
- wood for doors and windows

3.4. Ventilation

Ventilation system with heat recovery and geothermal heat exchanger: fresh air enters into the classrooms from the corridor; at the same time air is removed through the open ceiling void and taken to a central ventilation collector.

3.5. Lighting

- daylight atrium and clerestory windows, which provide light from two sides for classrooms



View of longitudinal facade with sun protection

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Bnwn - EOO - WbD Innovation
Evaluation form

3.6. Operation

- bus system installed to record the energy consumption parameters and to optimize the operation
- zone valves which regulate heat transfer into the individual spaces centrally controlled



View into classrooms

4. Active renewable energy system

4.1. Solar

- photovoltaics: photovoltaic panels applied on the roof area above gym: photovoltaic surface 5.7m², total output of 714 watt
- solar thermal: solar water heating system applied on the roof area above gym: collectors surface 16.5m²

4.2. Earth

Geothermal heat exchanger employed to pre-warm or pre-cool the supply air for the ventilation system



Cross section of classroom wing with functional diagram of building ventilation, not to scale

Printing date: 28/09/2008

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