



## **The Future for Sustainable Built Environments with High Performance Energy Systems –**

***“Towards Energy Efficient Building and Communities “***

Rolf Stricker, PtJ – ERG1

Conference Annex 49, 19. - 21. October 2010, Munich

## TOPIC

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- Projekt Management Jülich (PtJ)
- IEA Structure and Implementing Agreement (IA) ECBCS
- IEA Funding in Germany: 5th Energy Research Programme Germany: Energy optimized building construction ('EnOB')
- The double-stage precondition of BMWi energy research priority EnOB:  
- Benefit/Cost Ratio comparison
- EnOB Research Project Information Service (BINE)



› **Project Management Jülich**

Partner for Research Management

## Project Management Jülich - Competence Profile

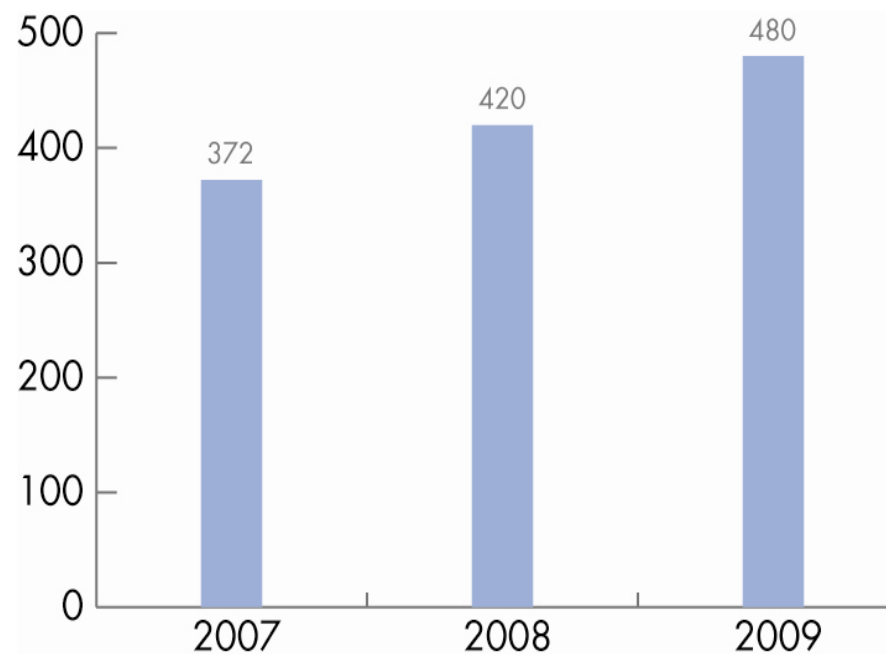
<b>Scientific competence</b>	<b>Structural competence</b>	<b>Administrative competence</b>
<ul style="list-style-type: none"><li>■ Biotechnology</li><li>■ Energy</li><li>■ Materials technologies</li><li>■ Environment and sustainability</li><li>■ Marine and polar research, geo-technologies</li><li>■ Navigation and marine technology</li></ul>	<ul style="list-style-type: none"><li>■ Regional technology platforms / clusters</li><li>■ Technology transfer and start-up companies</li></ul>	<ul style="list-style-type: none"><li>■ Funding structures</li><li>■ Funding procedures</li><li>■ Funding regulations</li></ul>

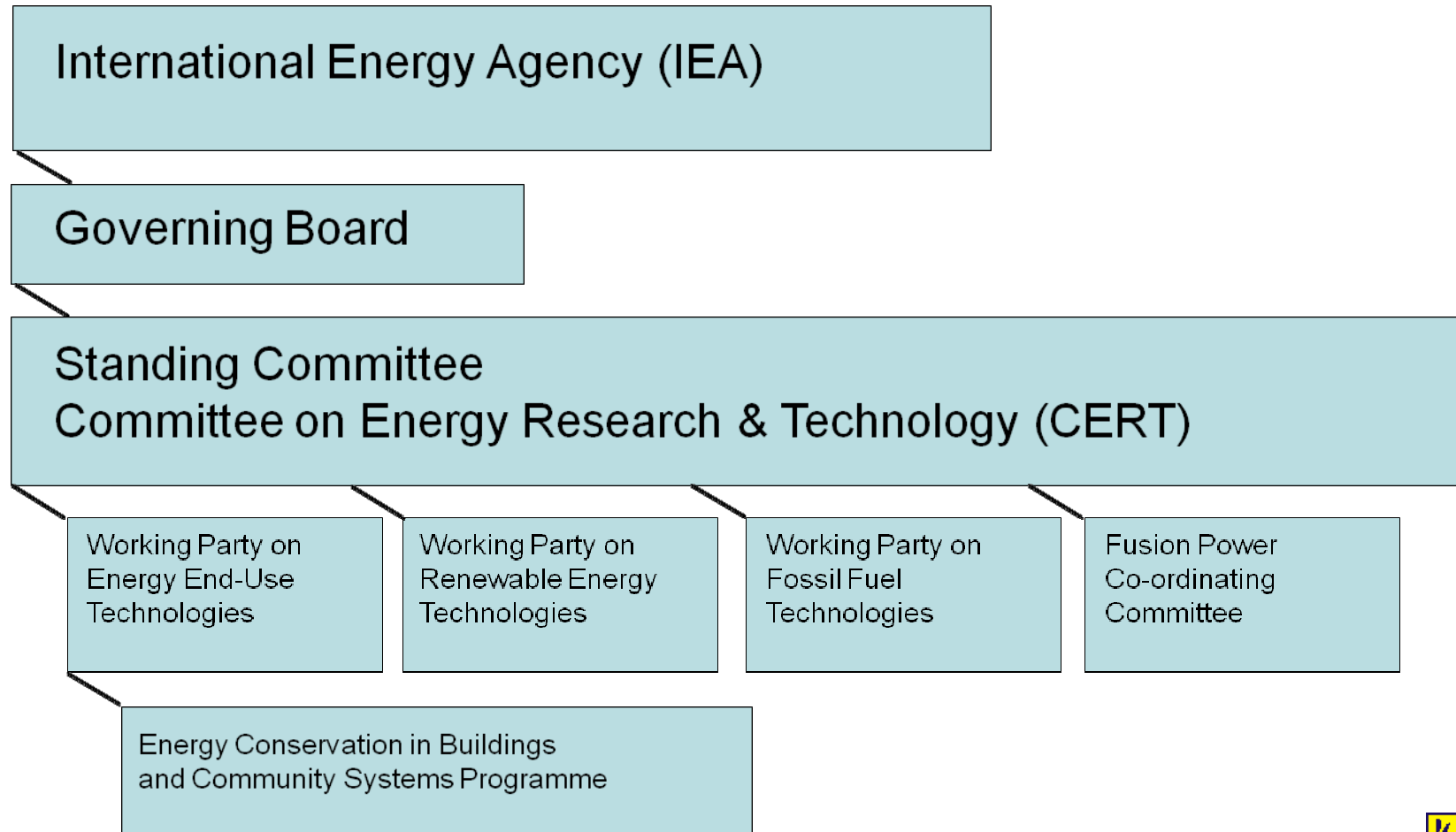
## Project Management Jülich

### Funding Volume 2009

	Volume € million
Federal Ministry of Education and Research (BMBF)	549.4
Federal Ministry of Economics and Technology (BMWi)	171.0
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)	152.2
Federal Ministry of Transport, Building and Housing (BMVBS)	26.6
Federal states	9.7
	<b>908.9</b>

### Staff 2009





## **Implementing Agreement (IA): ECBCS Programme**

(Energy Conservation in Buildings and Community Systems)

- Collaborative research & development Agreement (since 1977)
- Twenty two countries and the EC
- 45 research projects (Annexes) and two Working Groups
- Extensive technology transfer

## ECBCS Executive Committee Members

<i>Australia</i>	Mr Colin Blair ( <a href="mailto:colin.blair@standards.org.au">colin.blair@standards.org.au</a> )
<i>Belgium</i>	Prof Jean Lebrun ( <a href="mailto:j.lebrun@ulg.ac.be">j.lebrun@ulg.ac.be</a> )
<i>Canada</i>	Dr Morad Atif ( <a href="mailto:Morad.Atif@nrc-cnrc.gc.ca">Morad.Atif@nrc-cnrc.gc.ca</a> )
<i>Czech Republic</i>	Irena Plockova ( <a href="mailto:plockova@mpo.cz">plockova@mpo.cz</a> )
<i>CEC</i>	tba
<i>Denmark</i>	Mr Jens Windeleff ( <a href="mailto:jew@ens.dk">jew@ens.dk</a> )
<i>Finland</i>	Mr Markku Virtanen ( <a href="mailto:markku.virtanen@take-finland.com">markku.virtanen@take-finland.com</a> )
<i>France</i>	Mr Pierre Hérant ( <a href="mailto:pierre.herant@ademe.fr">pierre.herant@ademe.fr</a> )
<i>Germany</i>	Mr Jurgen Gehrman ( <a href="mailto:j.gehrmann@fz-juelich.de">j.gehrmann@fz-juelich.de</a> )
<i>Greece</i>	Mr Dimitrios Nomidis ( <a href="mailto:nomidisd@ypan.gr">nomidisd@ypan.gr</a> )
<i>Israel</i>	Mr Avraham Arbib ( <a href="mailto:aarbib@mni.gov.il">aarbib@mni.gov.il</a> )
<i>Italy</i>	Dr Marco Citterio ( <a href="mailto:citterio@casaccia.enea.it">citterio@casaccia.enea.it</a> )

## ECBCS Executive Committee Members

<i>Japan</i>	Prof Yuichiro Kodama ( <i>y-kodama@kobe-du.ac.jp</i> )
<i>Netherlands</i>	Mr Piet Heijnen ( <i>p.heijnen@novem.nl</i> )
<i>New Zealand</i>	Mr Michael Donn ( <i>michael.donn@vuw.ac.nz</i> )
<i>Norway</i>	Dr Jørn Brunsell ( <i>jorn.brunsell@broadpark.no</i> )
<i>Poland</i>	Prof Stanislaw Mierzwinski ( <i>smierzwinski@kowito.ise.polsl.gliwice.pl</i> )
<i>Portugal</i>	Prof Eduardo Maldonado ( <i>ebm@fe.up.pt</i> )
<i>Sweden</i>	Mr Conny Rolén ( <i>conny.rolen@formas.se</i> )
<i>Switzerland</i>	Mr Mark Zimmermann ( <i>mark.zimmermann@empa.ch</i> )
<i>Turkey</i>	tba
<i>UK</i>	Dr Paul Davidson ( <i>davidsonp@bre.co.uk</i> )
<i>USA</i>	Mr Richard Karney ( <i>richard.karney@ee.doe.gov</i> )

## ECBCS Completed Annexes [36] (1 of 4)

- Annex 1 Load Energy Determination of Buildings
- Annex 2 Ekistics and Advanced Community Energy Systems
- Annex 3 Energy Conservation in Residential Buildings
- Annex 4 Glasgow Commercial Building Monitoring
- Annex 6 Energy Systems and Design of Communities
- Annex 7 Local Government Energy Planning
- Annex 8 Inhabitant Behaviour with Regard to Ventilation
- Annex 9 Minimum Ventilation Rates
- Annex 10 Building HEVAC Systems Simulation
- Annex 11 Energy Auditing
- Annex 12 Windows and Fenestration

## ECBCS Completed Annexes (2 of 4)

- Annex 13 Energy Management in Hospitals
- Annex 14 Condensation and Energy
- Annex 15 Energy Efficiency in Schools
- Annex 16 Building Energy Management Systems - User Interfaces and System Integration
- Annex 17 Building Energy Management Systems- Evaluation and Emulation Techniques
- Annex 18 Demand Controlled Ventilation Systems
- Annex 19 Low Slope Roof Systems
- Annex 20 Air Flow Patterns within Buildings
- Annex 21 Environmental Performance
- Annex 22 Energy Efficient Communities

## ECBCS Completed Annexes (3 of 4)

- Annex 23 Multi-zone Air Flow Modeling
- Annex 24 Heat, Air and Moisture Transport
- Annex 25 Real Time HVAC Simulation
- Annex 26 Energy Efficient Ventilation of Large Enclosures
- Annex 27 Evaluation and Demonstration of Domestic Ventilation Systems
- Annex 28 Low Energy Cooling
- Annex 29 Daylighting in Buildings
- Annex 30 Bringing Simulation Models to Engineers
- Annex 31 Energy Related Environmental Impact of Buildings
- Annex 32 Integral Building Envelope Performance Assessment
- Annex 33 Advanced Local Energy Planning

## ECBCS Completed Annexes (4 of 4)

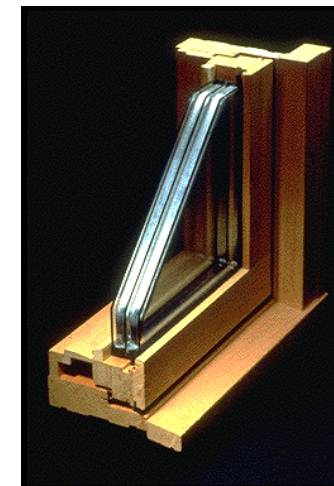
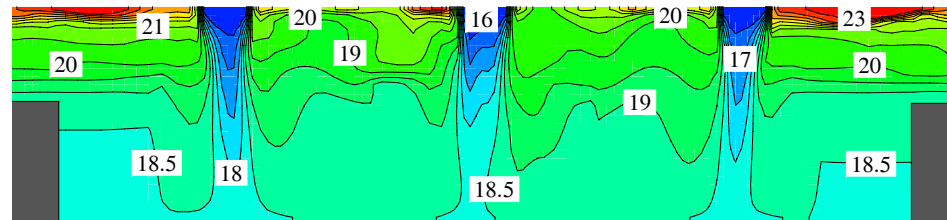
- Annex 34 Computer-aided Evaluation of HVAC System Performance
- Annex 35 Control Strategies for Hybrid Ventilation in New and Retrofitted Office Buildings (Hybvent)
- Annex 36 Retrofitting in Educational Buildings - Energy Concept Advisor for Technical Retrofit Measures
- Annex 37 Low Exergy Systems for Heating and Cooling of Buildings

## ECBCS On-Going Annexes [12]

- Annex 5 Air Infiltration and Ventilation Centre
- Annex 41 Whole building heat, air and moisture response
- Annex 42 The Simulation of Cogeneration Systems
- Annex 43 Testing and Valid. of Building Energy Sim.-Tools
- Annex 44 Integrating Environmentally Responsive Elements in Buildings
- Annex 45 Energy Efficient Electric Lighting for Buildings
- Annex 46 Energy Efficient Retrofit Measures for Government Buildings
- Annex 47 Cost-Effective Commissioning for Existing and Low Energy Buildings
- Annex 48 Heat pumping and reversible air conditioning
- Annex 49 Low Exergy Systems for High-Performance Built Environments
- Annex 44 Integrating Environmentally Responsive Elements in Buildings
- Annex 45 Energy Efficient Electric Lighting for Buildings

## Areas of Applications

- Design and Business Environment
  - Design Tools, Guides
  - Software, Algorithms
  - Guidelines, Process, Evaluation
  
- Building Assemblies and Systems
  - Building Envelope (window, walls)
  - HVAC, Lighting
  - Fuel Cell



## The Air Infiltration and Ventilation Centre - Annex 5

- The AIVC provides technical support in air infiltration and ventilation research and application

Operating Agent:

Dr Peter Wouters

INIVE eeig

Boulevard Poincaré 79

B-1060 Brussels

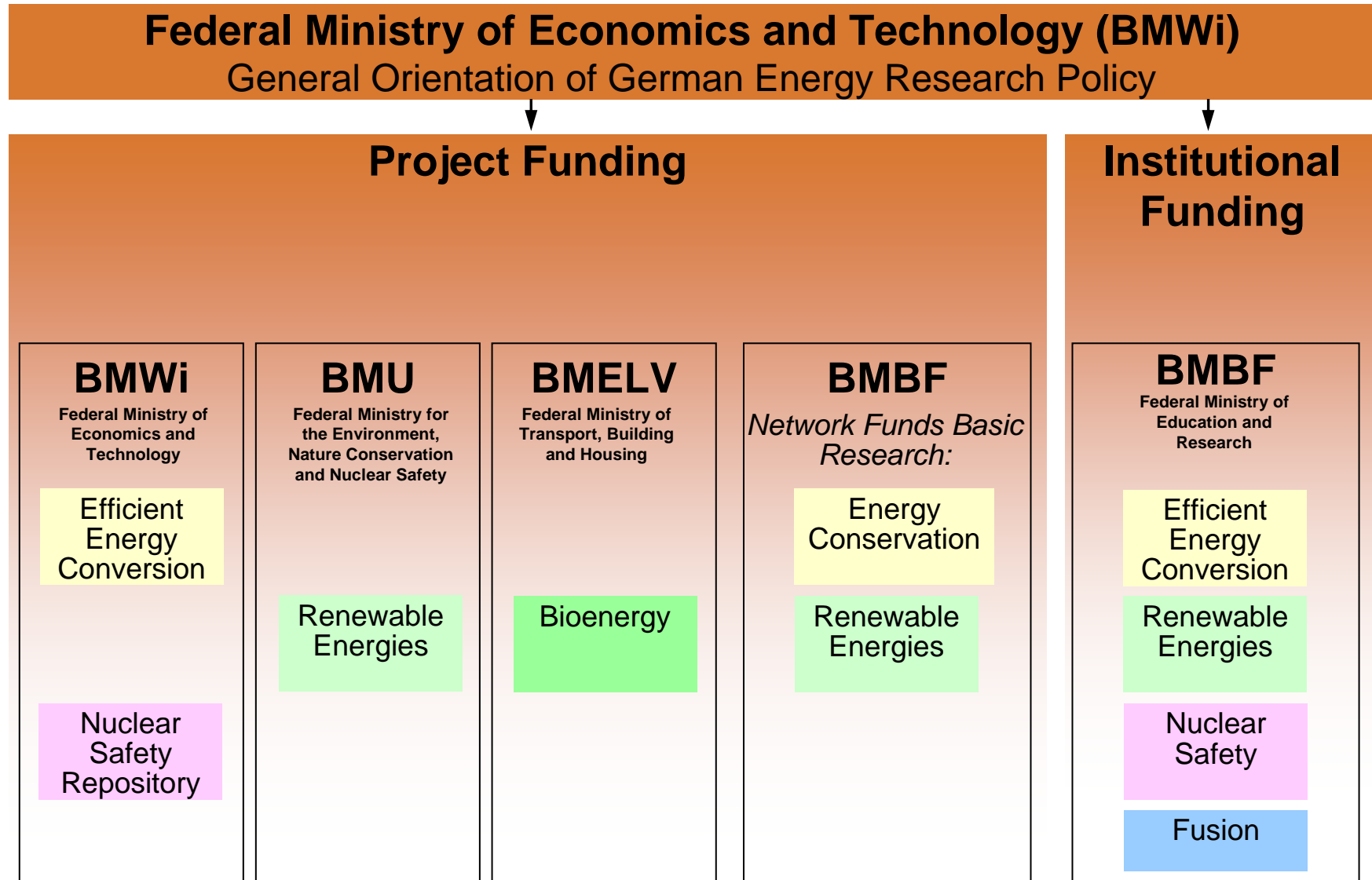
Belgium

T: +32 2 655 77 11

F: +32 2 653 0729

E: [inive@bbri.be](mailto:inive@bbri.be)

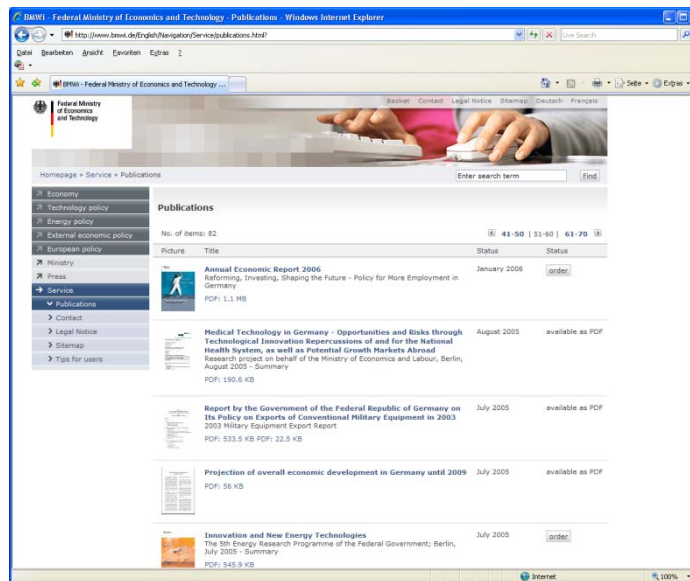
W: [www.aivc.org](http://www.aivc.org)



## The 5th Energy Research Programme of the Federal Government of Germany

### Download (pdf-file) - WebLink:

- ▶ <http://www.bmwi.de/English/Navigation/Service/search.html?>
- ▶ **Page 61-70**

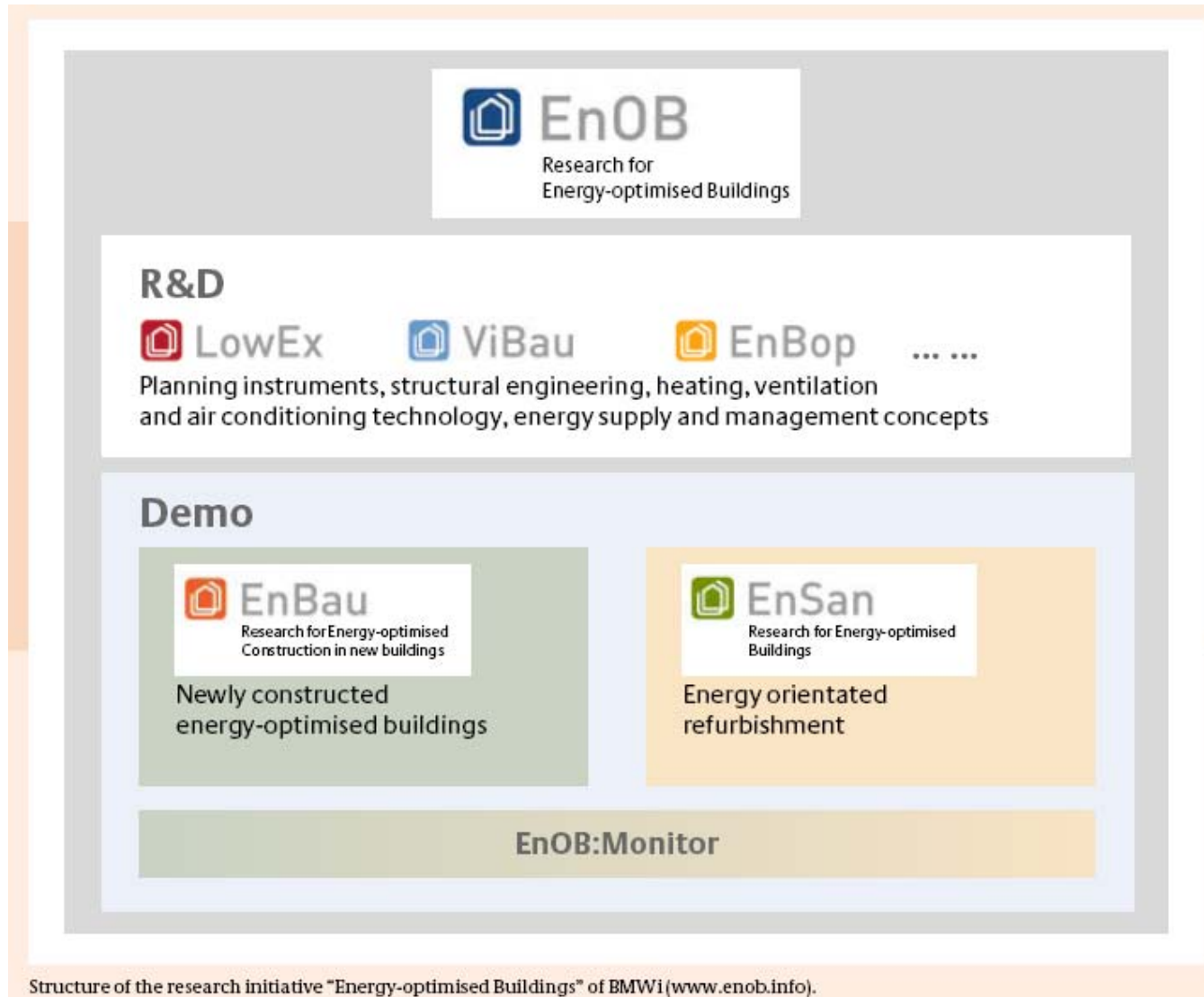


## The 5th Energy Research Programme of the Federal Government of Germany



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*Towards Energy Efficient Building and Communities*



The double-stage precondition of BMWi  
energy research priority 'EnOB':

-  1. Minimizing building heating und cooling loads  
(by passive measures: building envelope)
-  2. Optimizing HVAC Systems  
(on basis of 1.)

*Towards Energy Efficient Building and Communities*

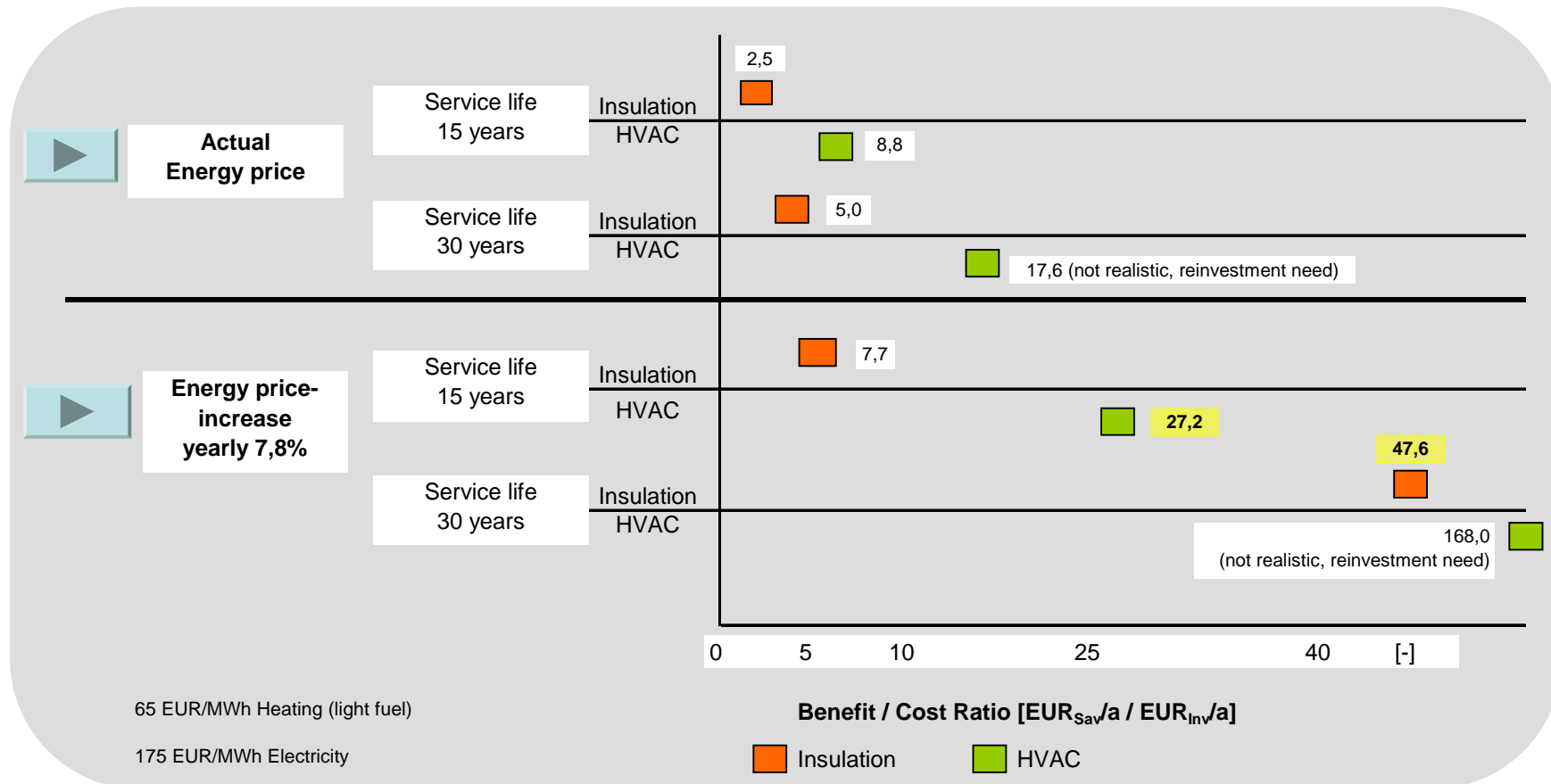
	(1)	(2)	(3)=(1)/(2)	(4)	(5)=(1)/(4)	(6)=(2)/(5)
<b>Example:</b>	Invest	<b>Benefit per year (Savings)</b>	Rate of Return ROI	<b>Service Life</b>	Cost per year service life	<b>Benefit-Cost-Ratio related to service life</b>
	[EUR]	[EUR <sub>Sav</sub> /a]	[a]	[a]	EUR <sub>Inv</sub> /(a)	[€ <sub>Sav</sub> /(a) / € <sub>Inv</sub> /(a)]
<b>Insulation</b>	<b>100.000</b>	<b>16.667</b>	<b>6</b>	6	16.667	1
Building	100.000	16.667		10	10.000	1,7
Enevelope	100.000	16.667		<b>15</b>	6.667	<b>2,5</b>
	100.000	16.667		20	5.000	3,3
	100.000	16.667		<b>30</b>	3.333	<b>5,0</b>
<b>HVAC System</b>	<b>50.000</b>	<b>29.412</b>	<b>1,7</b>	1,7	29.412	1
e.g. Fans	50.000	29.412		10	5.000	5,9
Frequency Converter	50.000	29.412		<b>15</b>	3.333	<b>8,8</b>
	50.000	29.412		20	2.500	11,8
	50.000	29.412		<b>30</b>	1.667	<b>17,6</b>

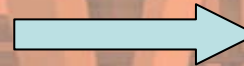
**Consideration Energy Price Increase**

Assumption: linear extrapolation of average last 5 years increase (7,8 %/a)

		0,078				
<b>Insulation</b>	<b>100.000</b>	<b>26.155</b>	<b>3,8</b>	6	16.667	1,6
Building	100.000	35.321		10	10.000	3,5
Enevelope	100.000	51.420		<b>15</b>	6.667	<b>7,7</b>
	100.000	74.856		20	5.000	15,0
	100.000	158.640		<b>30</b>	3.333	<b>47,6</b>
<b>HVAC System</b>	<b>50.000</b>	<b>33.417</b>	<b>1,5</b>	1,7	29.412	1,1
e.g. Fans	50.000	62.332		10	5.000	12,5
Frequency Converter	50.000	90.741		<b>15</b>	3.333	<b>27,2</b>
	50.000	132.098		20	2.500	52,8
	50.000	279.952		<b>30</b>	1.667	<b>168,0</b>

*Towards Energy Efficient Building and Communities*





<http://www.enob.info>

# EnOB

Forschung für  
Energieoptimiertes  
Bauen

 **EnBau**

 **EnSan**

 **EnBop**

 **LowEx**



Research for energy-optimised construction

<http://www.enob.info/en/>

EnOB  
Forschung für  
Energieoptimiertes Bauen

Getördert durch das  
Bundesministerium  
für Wirtschaft  
und Technologie

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keyword

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- Refurbishment
- New Technologies
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- Research Areas

### EnOB: Research for energy-optimised construction

"Buildings of the future" - this is the guiding concept of EnOB, energy-optimised construction (the name EnOB is an abbreviation of the equivalent German term). The research projects sponsored by the German Federal Ministry of Economics and Technology (BMWi) involve buildings which have minimal primary energy requirements and high occupant comfort, with moderate investment costs and significantly reduced operating costs. Learn more about the various areas on which EnOB research is focussed, and about the testing of new concepts, technologies and materials in model projects. [read more](#)

#### Architectural Contest

High occupant comfort combined with minimal energy requirement and operating costs, efficient technologies in the context of high quality architectural approach - these were the benchmarks in architectural contest of the German Ministry of Economy and Technology. We present the 10 awarded projects (in German - briefly in English). [in detail](#)

#### Development Trends

At the EnOB status seminar, research teams will be offering an insight into their current projects. In particular, this two-day event will concentrate on technologies, systems and tools from the research sector. For example, window and facade systems, HVAC technology, building-integrated heat storage and new approaches in modelling and operational optimisation will be dealt with. [in detail](#)

#### News

- 08. May 2009 - [Refurbished student accommodation passes practical test with living colours](#)
- 08. May 2009 - [Award for ZAE Bayern as a "Landmark in the Land of Ideas"](#)
- 08. May 2009 - [EnOB building with sustainability certificate](#)

[all news](#)

#### Events

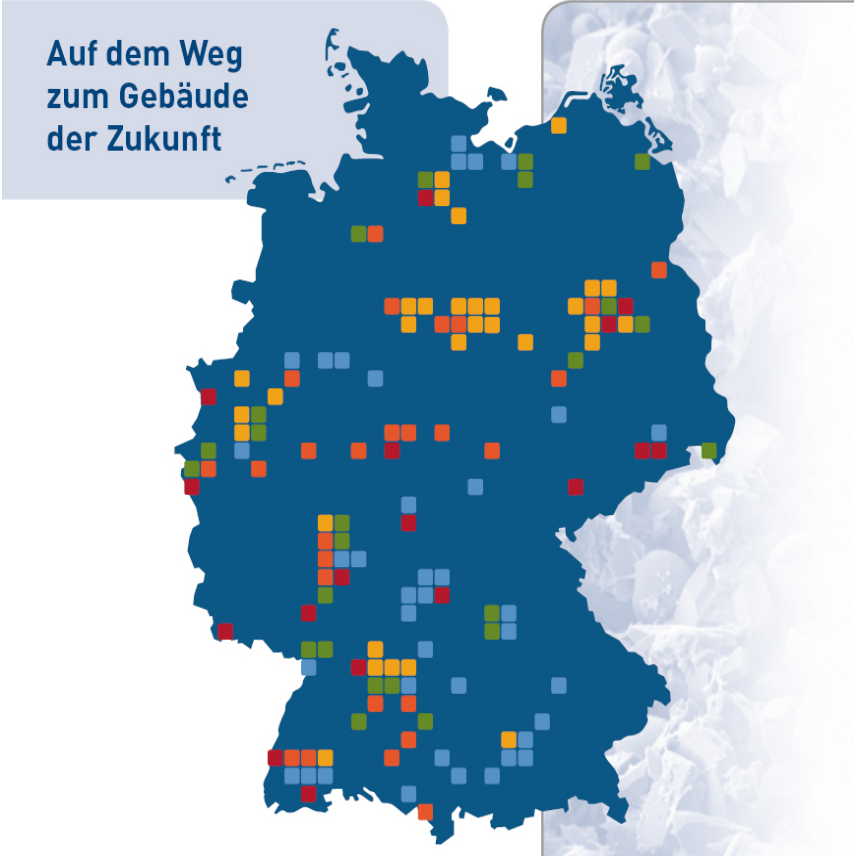
- 21.-30. September 2009 | Wuppertal  
[Summer Academy 2009 - Architecture with Energy](#)
- 30. 6. - 2. 7. 2009 | Würzburg  
[EnOB status seminar: Current development trends for practical applications](#)
- 4. Mai 2009 | Berlin  
[EnOB forum "Buildings of the future - Architecture with Energy"](#)

[all events](#)



# EnOB

Forschung für  
Energieoptimiertes Bauen



EnBau



EnSan



EnBop



LowEx



ViBau



projektinfo 10/08

[http://www.bine.info/fileadmin/content/Publikationen/Projekt-Infos/2008/Projekt-Info\\_10-2008/projekt\\_1008\\_engl\\_internet-x.pdf](http://www.bine.info/fileadmin/content/Publikationen/Projekt-Infos/2008/Projekt-Info_10-2008/projekt_1008_engl_internet-x.pdf)

### Integrated building management



- ▶ Simplified energy controlling using automated data acquisition and new evaluation software
- ▶ Direct consumption monitoring allows for prompt diagnosis of errors
- ▶ Easy comparison of target and actual values by means of 'energy traffic light'
- ▶ Building automation is also suitable for smaller buildings
- ▶ Data acquisition system compatible with all standard transmission systems

The LAS GmbH office block in Leipzig with the 'energy traffic light' - room-by-room consumption ranking

The increasing contribution of energy costs to rent costs is making it even more important to reduce costs and save on energy management technology and make it easier to develop new energy concepts. Custom-developed software provides users with



**Thank you for your attention**



**Gain new insights**