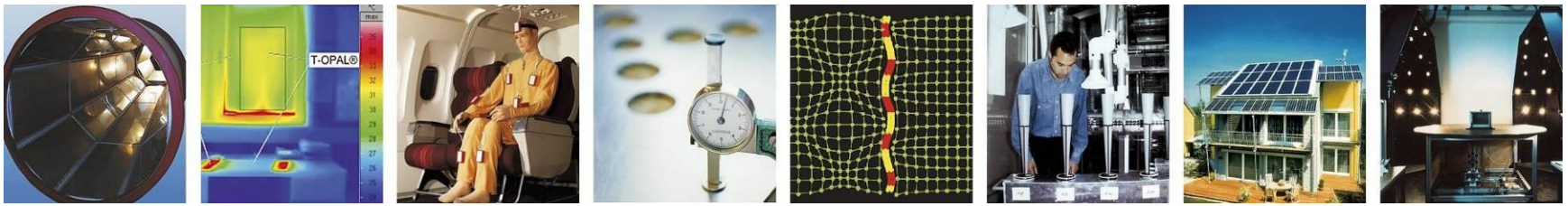
Low Energy Apartment Futures LEAF

Energieeffizienz in Mehrfamilienhäusern mit komplexer Eigentümerstruktur und WEGs

Georgi Georgiev | 20. Januar 2016 | Bauzentrum München

Low Energy
APARTMENT FUTURES

Co-funded by the Intelligent Energy Europe Programme of the European Union



Fraunhofer IBP

Fraunhofer Society
Branches in Germany

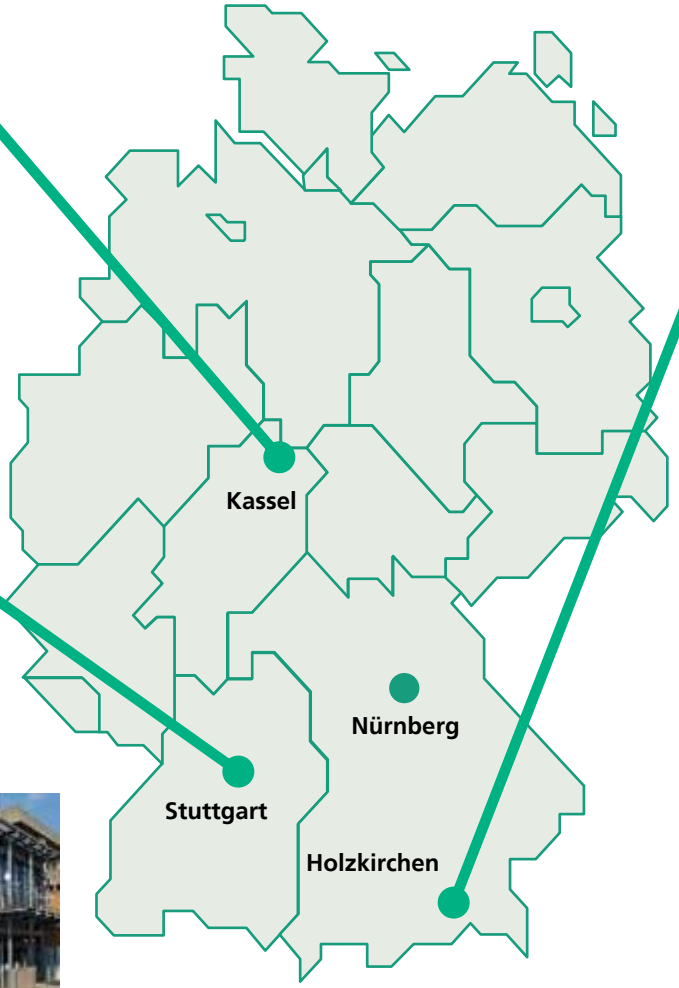
- 66 Institutes
- ~22 000 employees

Fraunhofer
IBP

Fraunhofer-Institute for Building Physics IBP

Branch Kassel

Institute Stuttgart



Branch Holzkirchen

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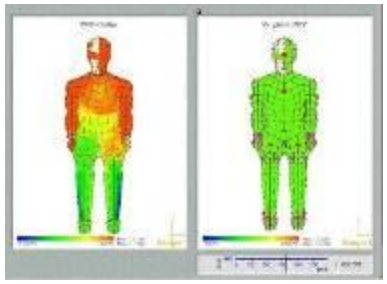
Main Research Fields of Fraunhofer IBP

Buildings



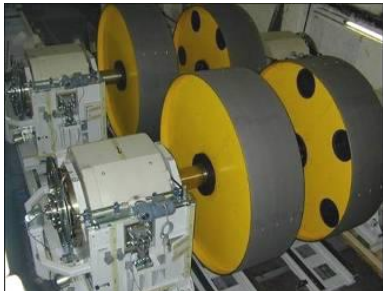



Aviation



Automotive





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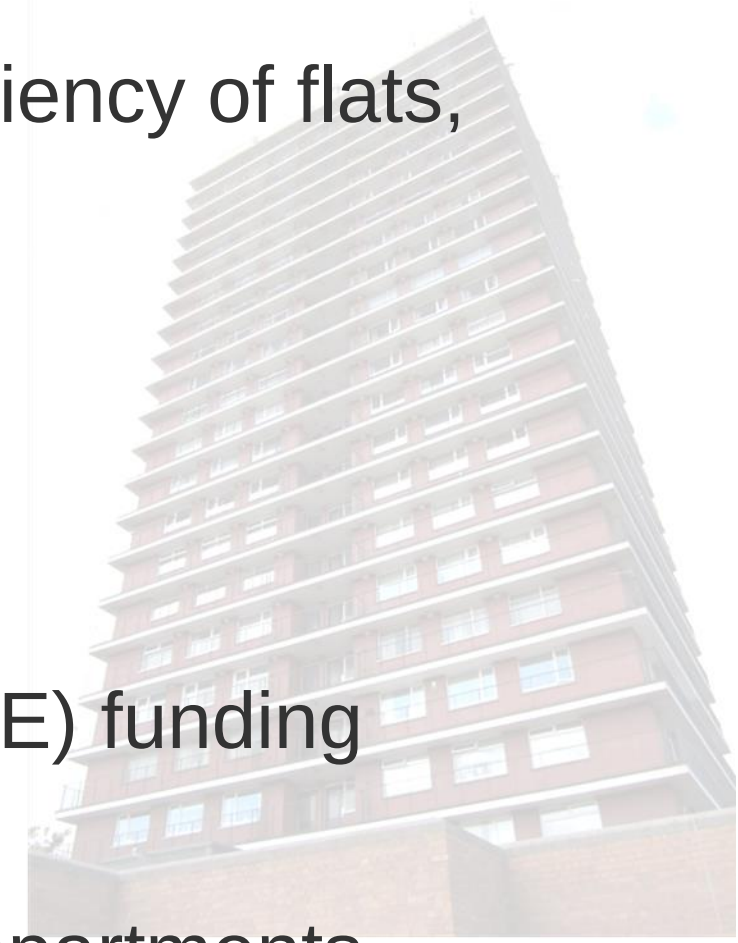
About the project

Aim = improve the energy efficiency of flats, apartments and tenements

- Multi-occupancy properties
- Taking whole block approach

- April 2013 – March 2016
- Intelligent Energy Europe (IEE) funding
- Six partner countries
- 24 case study blocks – 240 apartments



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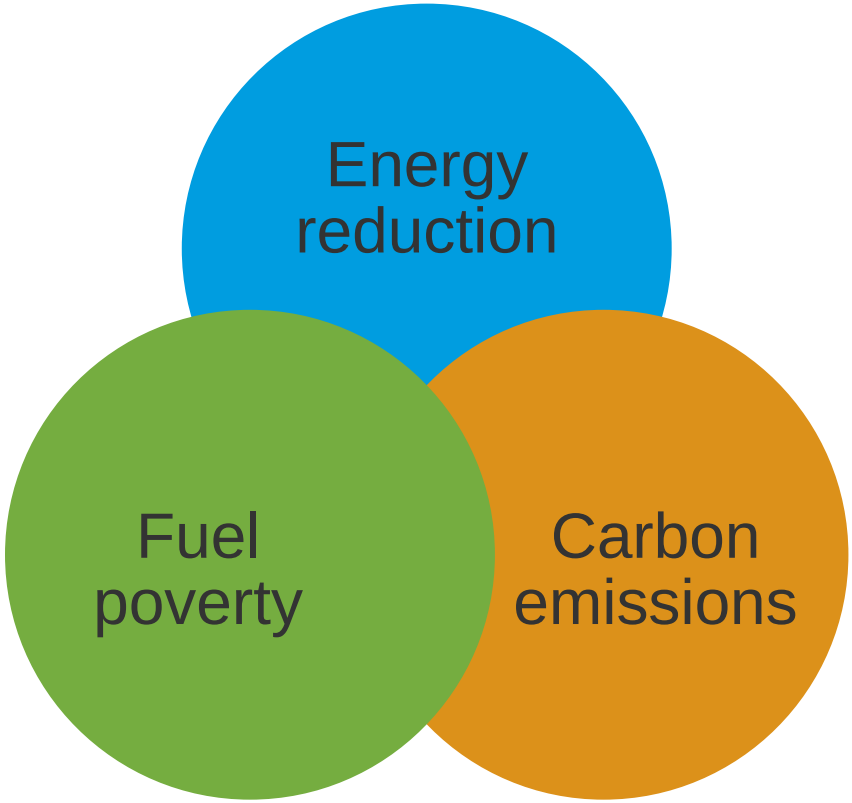
BACKGROUND

Drivers



EU targets by 2020:

- 20% of energy from renewables
- 20% increase in energy efficiency
- Reduce greenhouse gases by 20%

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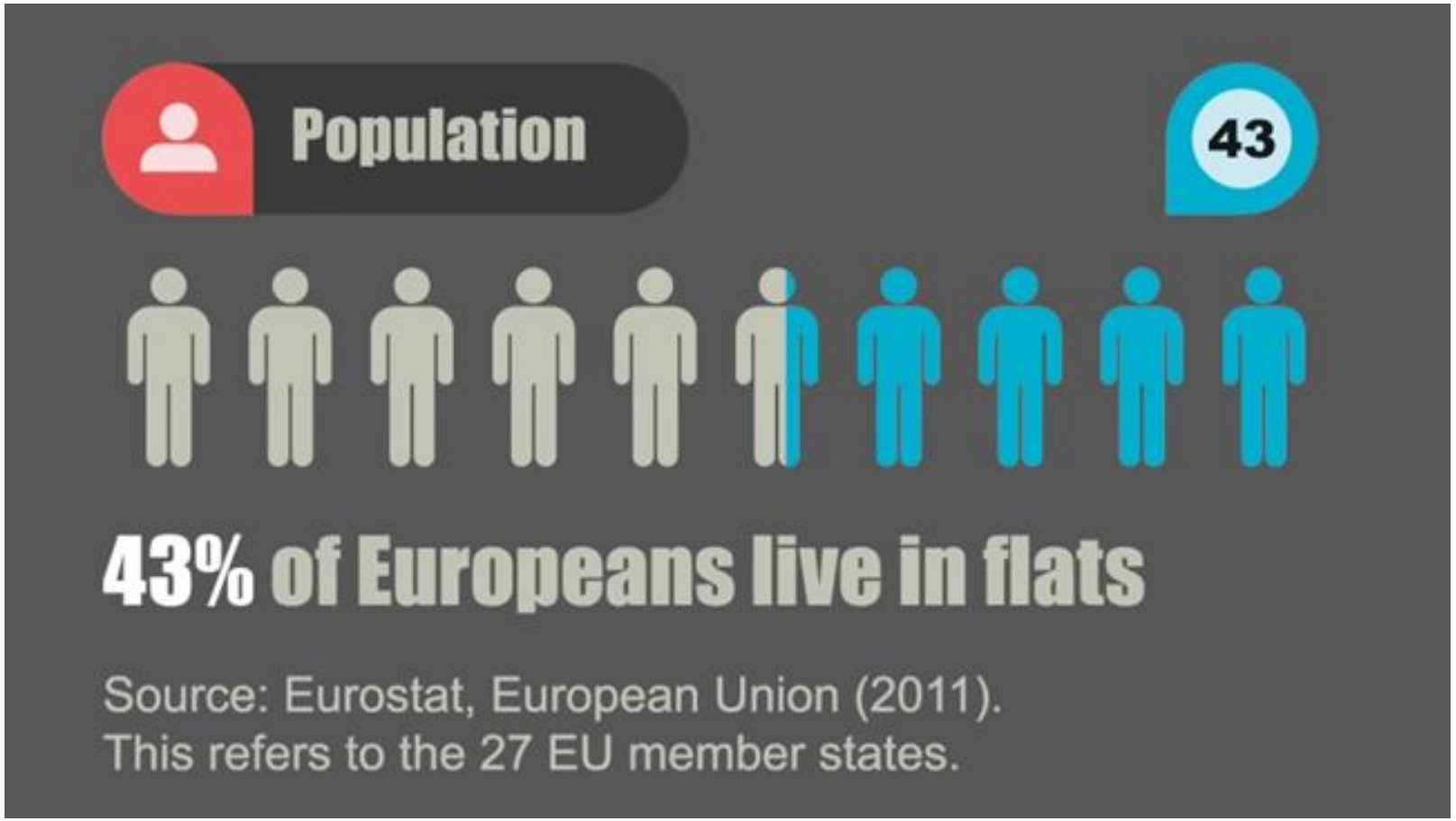
APARTMENT FUTURES

% of multi-occupancy housing



Common barriers

Financial	• Access to finance • Payback expectations • Competing purchase decisions • Price signals
Institutional / admin	• Regulatory and planning issues • Institutional • Structural • Multi-stakeholder issues
Awareness & skills	• Information barrier • Awareness of benefits • Skills & knowledge related to building professionals

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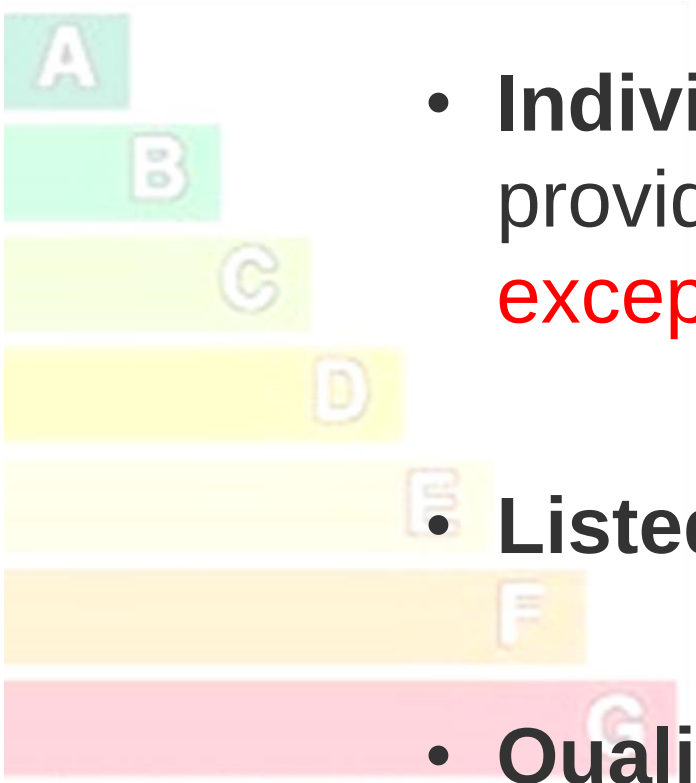
Different contexts: EPCs

- **Whole building** EPCs available in all partner countries except UK



- **Individual apartment** EPCs provided in all partner countries except Sweden and Germany
- **Listed buildings** can be exempt
- **Quality** of output

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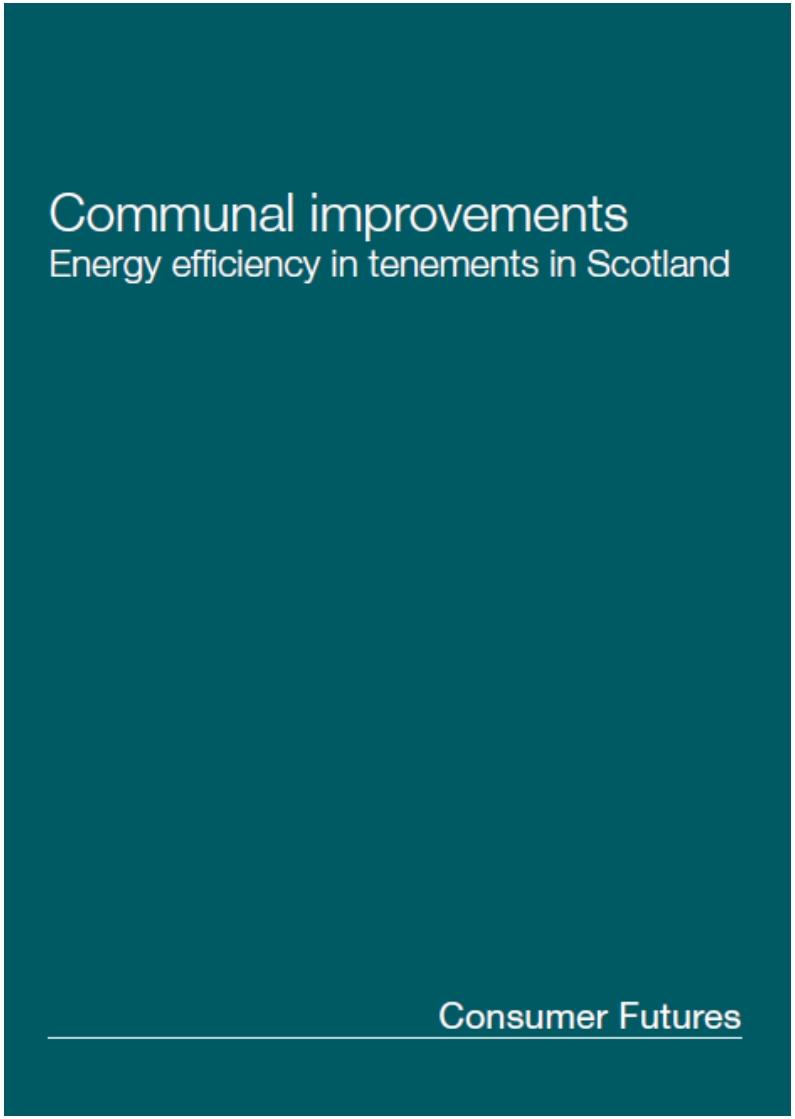
Different contexts: management

- Property managers or management boards exist in all partner countries except the UK
  - Often required to have annual meetings
- Various ownership models:
  - Housing co-operatives
  - Homeowner association
  - Fully owned by one organisation
  - Fully private owned (different owners)
- Decision procedures and voting rights vary
  - Majority usually required for refurbishment

Scottish context

- Improvements more likely in individual flats than communally:
  - Getting agreement and securing finances is difficult
- Tenements Act - further clarity required
- Householders need to be persuaded of the benefits



ABOUT THE PROJECT

LEAF Partners

CHANGEWORKS

UPPSALA UNIVERSITET

Centre for Sustainable Energy

Fraunhofer IBP

flame
Fédération des Agences Locales de Maîtrise de l'Énergie et du climat

ENERGIAKLUB
SZAKPOLITIKAI INTÉZET
MÓDSZERTANI KÖZPONT

ale
agence locale de l'énergie
Lyon
agglomération

EMA
ENERGIE MARKT ANALYSE

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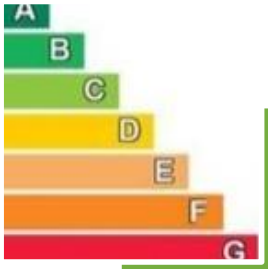
Toolkits



TECHNICAL TOOLKIT

- Reinforcing and beyond EPCs
- Info on:
  - What EPCs are
  - Descriptions of technical measures
  - Cost, savings and subsidies
  - User behaviour guidance
- Communal EPC tool (UK)

ENGAGAEMENT TOOLKIT

- Step-by-step guidance for managers
- Info and advice on:
  - Engaging and communicating with owners/ residents
  - Decision-making
  - Legal agreements
  - Planning consents
  - Signposting for further contacts

➢ **Both available in European-wide and national specific versions**

Low Energy APARTMENT FUTURES

Project impacts

CASE STUDIES

- 24 pilot projects in 6 countries (240+ flats)
- Whole building action plans
- Targets (per year):
  - 0.55t CO_2 saved
  - 2,300 kWh saved
  - 280 kWh generated

OTHER IMPACTS

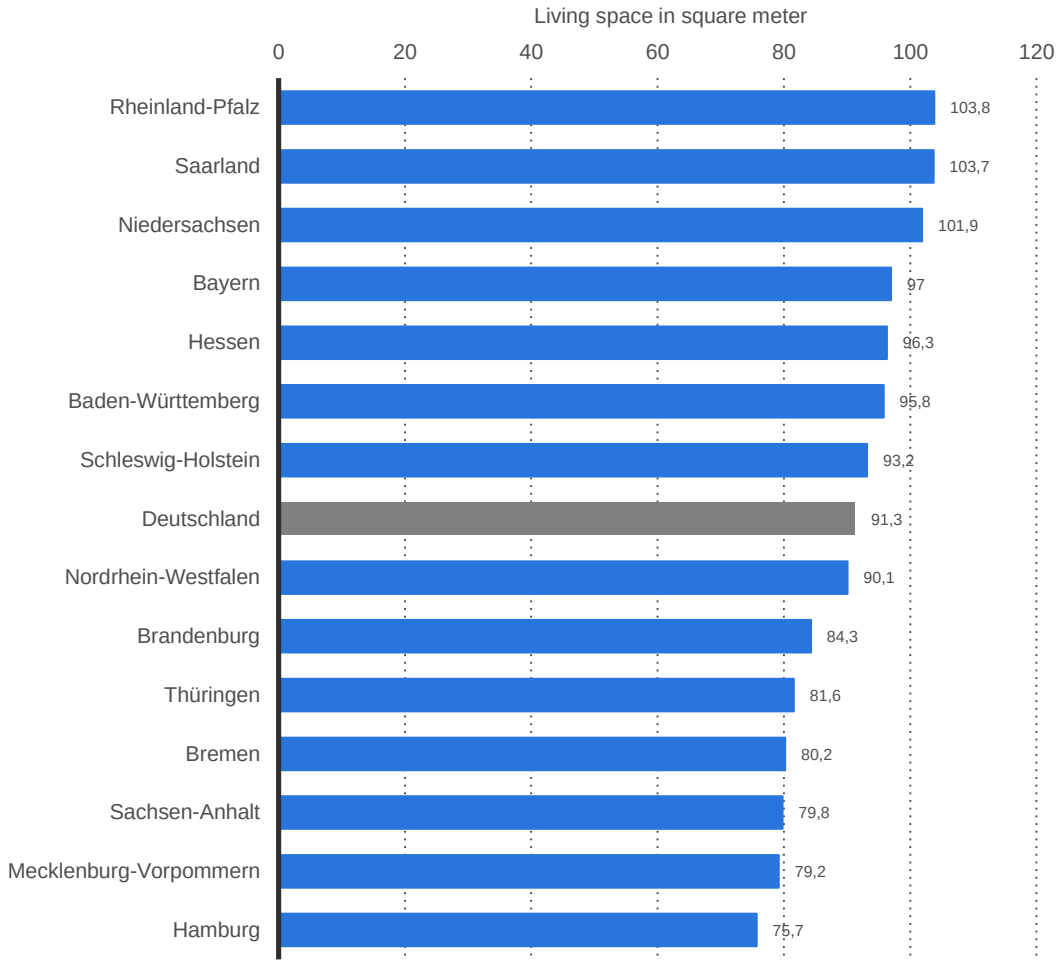
- Toolkits publicly available for other organisations to use
- Learnings from case studies
- Policy recommendations at local, national and EU levels related to:
  - EPCs
  - Multi-occupancy housing
  - Energy efficiency

- Federal Republic of Germany – goal – 2 % energy retrofit per year
- Realitiy . 0,6 % - 0,8 % per year
- 2100 – 100 % energy retrofitted residential building stock stock???
- Minimum 500 Euro/m² energy retrofit costs
- 40 Million private households in Germany, 28 % one-family houses
- World population: 7,4 Billion now (in 1930 – 2 Billion), 2 Billion under 16 years old now
- So, until 2030 we need to build the world from 1930 once again!!!
- According to the German building regulations and standards, we need 1.000 Billion tones of concrete to achieve this goal!!!

- We can’t apply the passive standard or the common building systems, because not enough ressources existing!!!

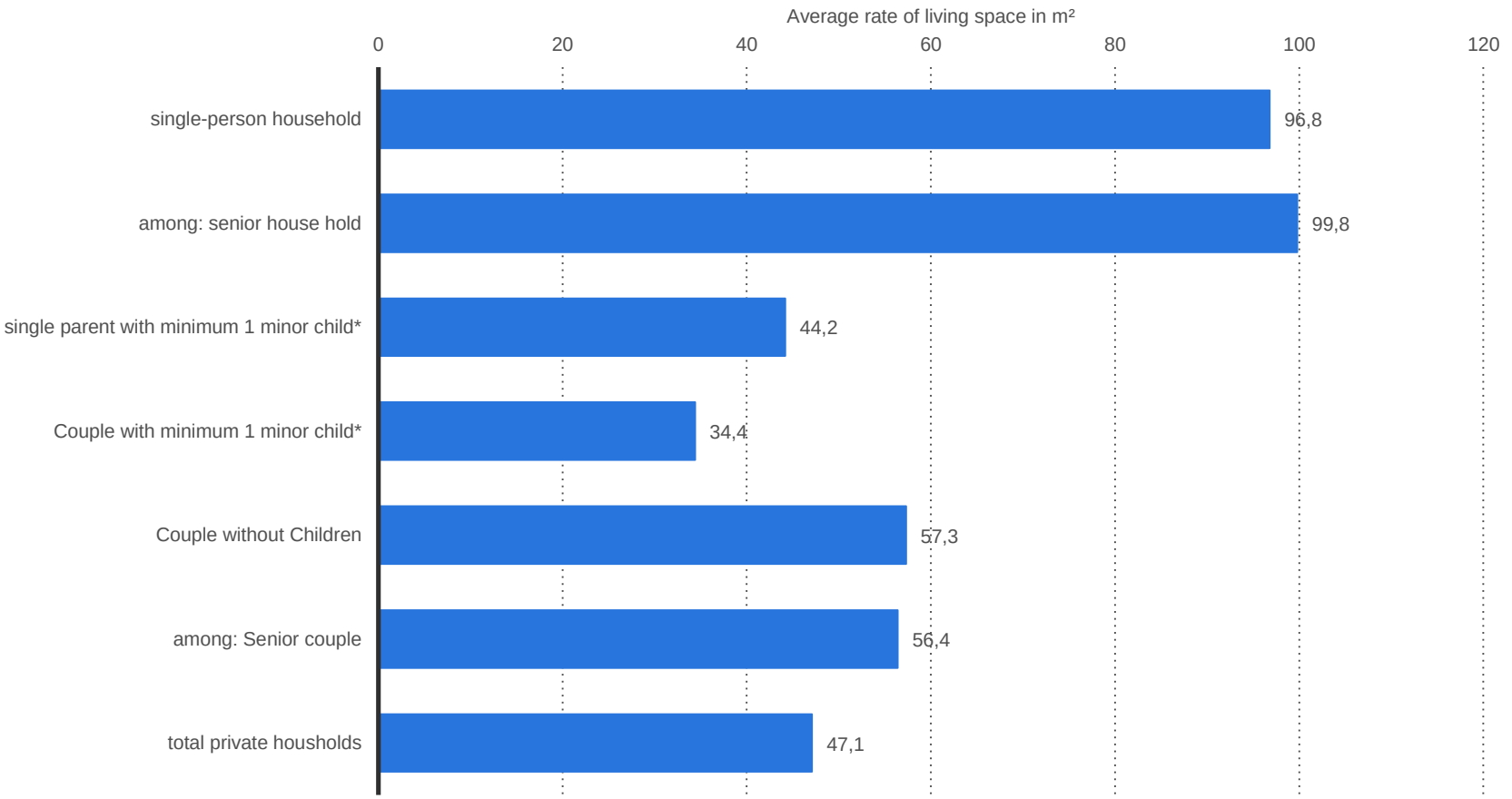
Living space per apartment in Germany according to the province 2013

Living space per apartment in square meter



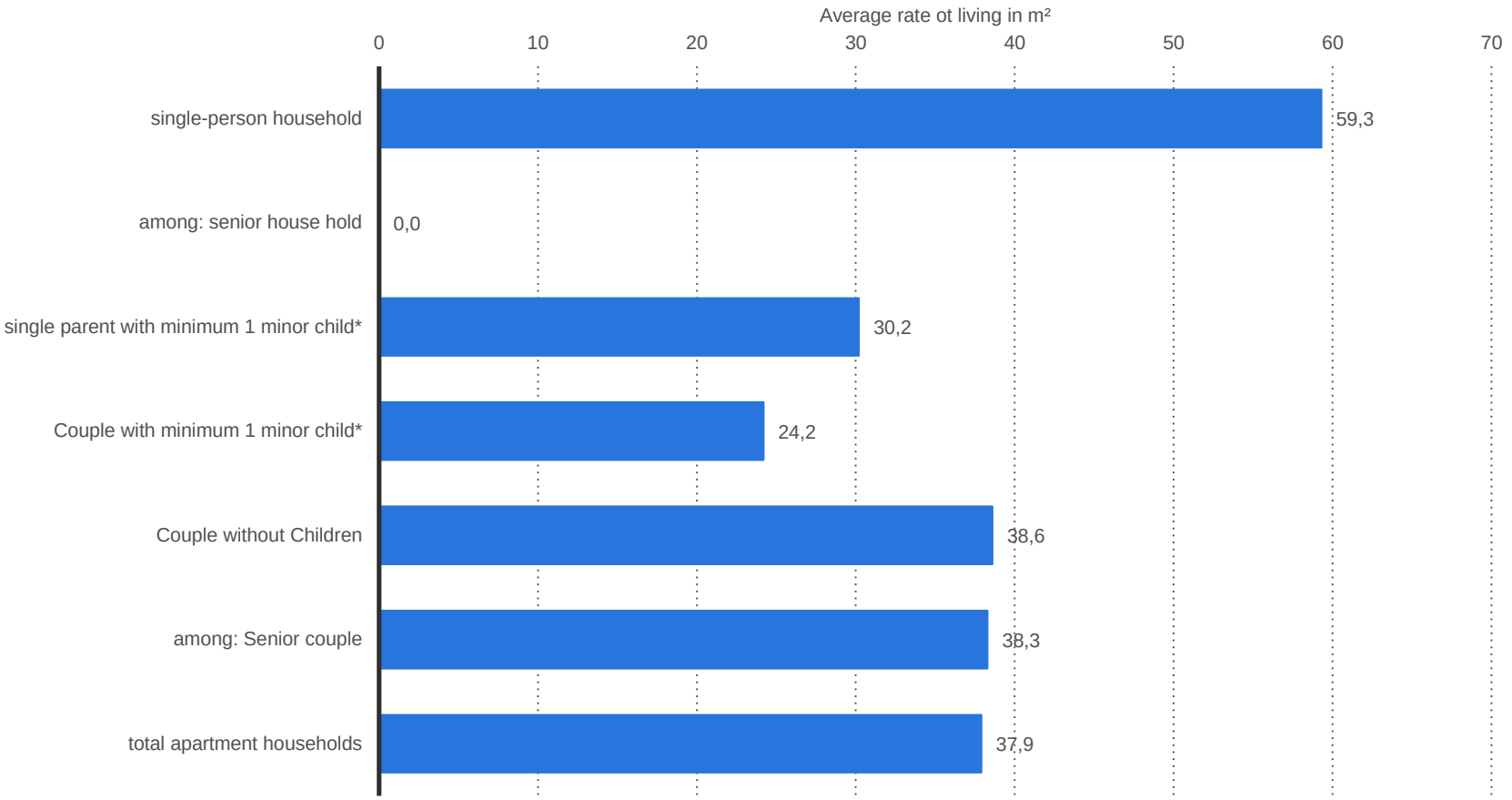
Living space per person in a private household depending on type of household 2011

Average rate of living space per person depending on type of household



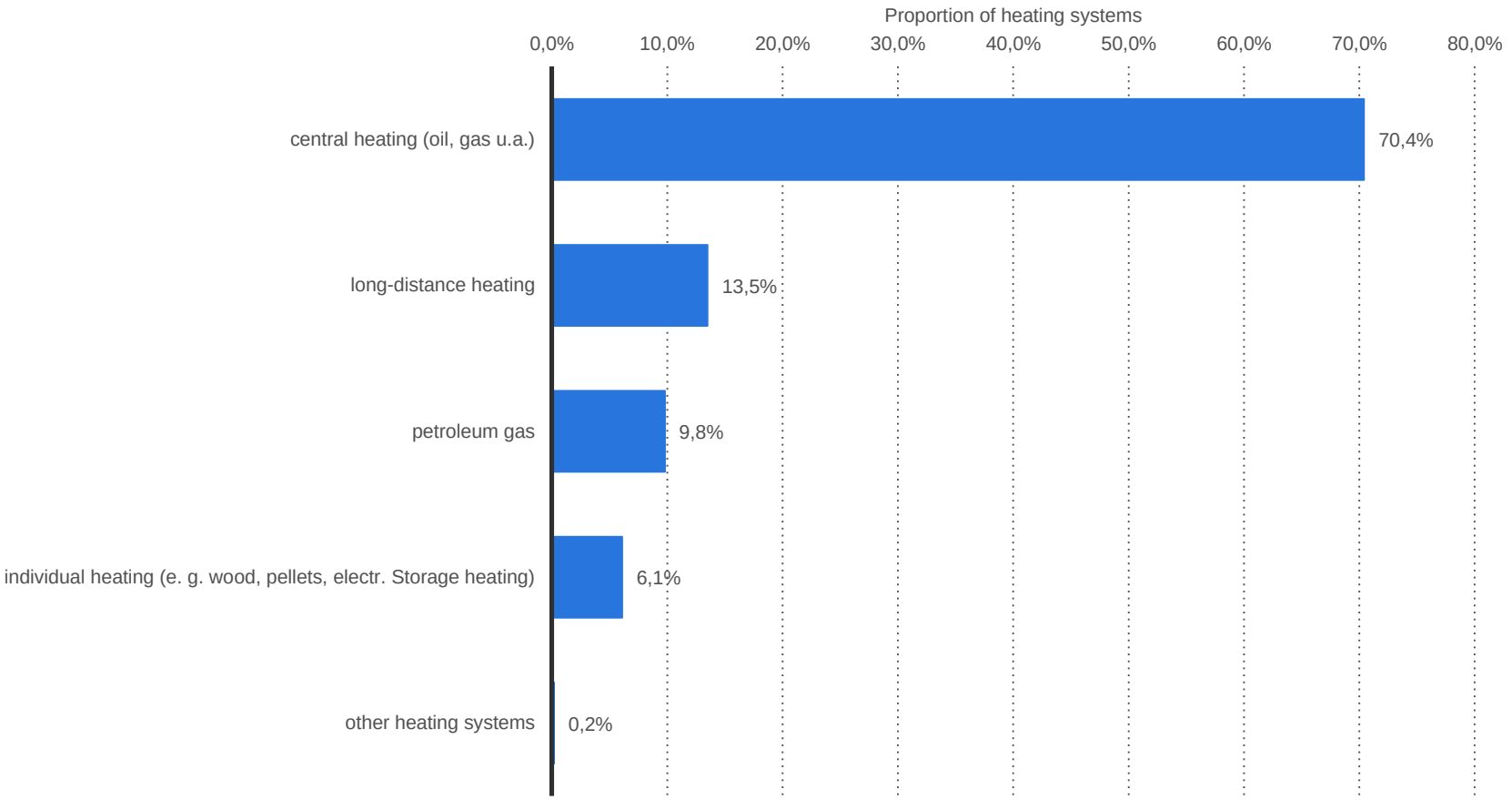
Living space per person in a rented apartment household depending on type of household 2011

Average rate of living space per person depending on type of household



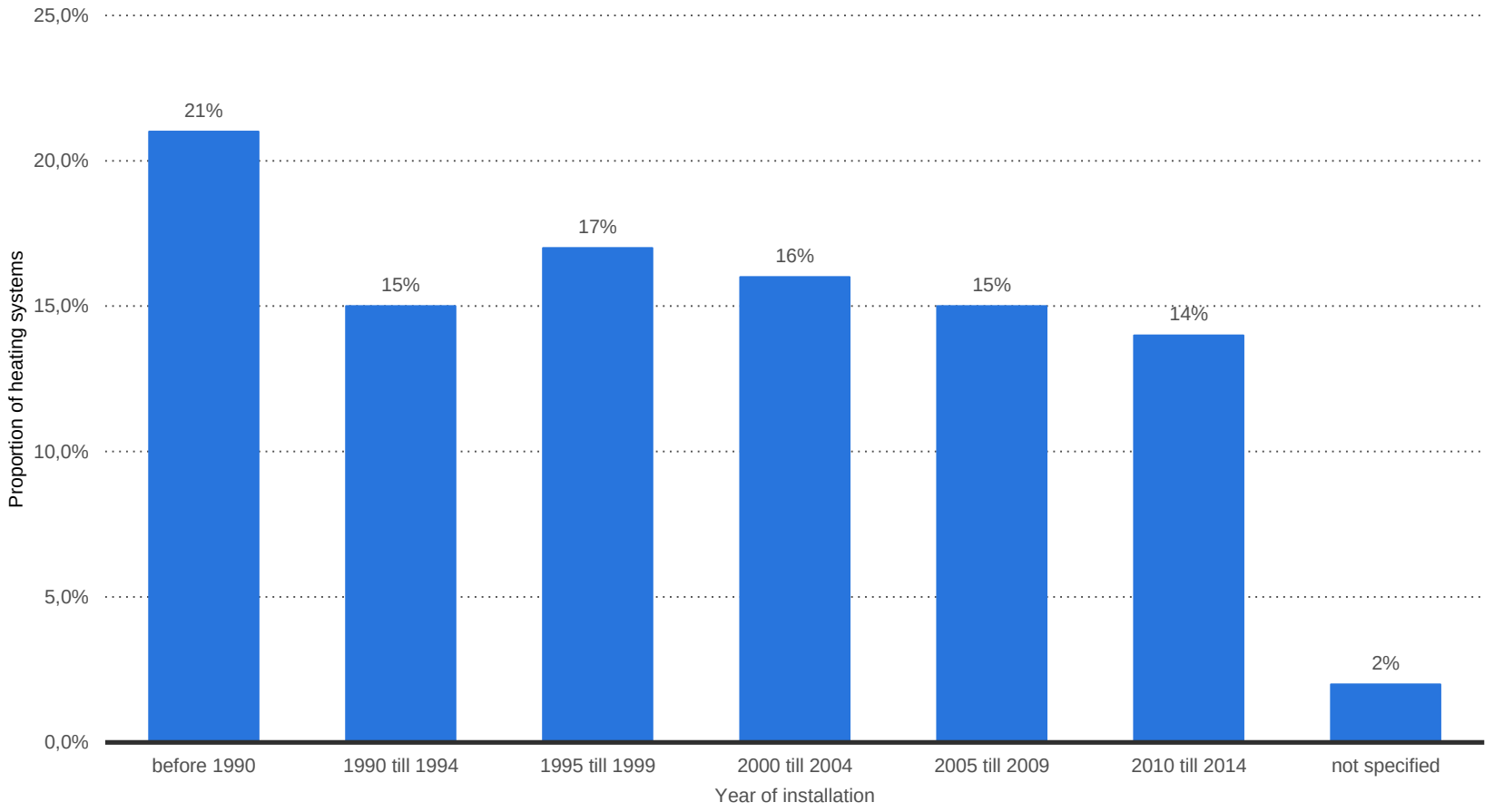
Used heating systems in German rented apartments

Composition of the heating systems in Germany in 2014



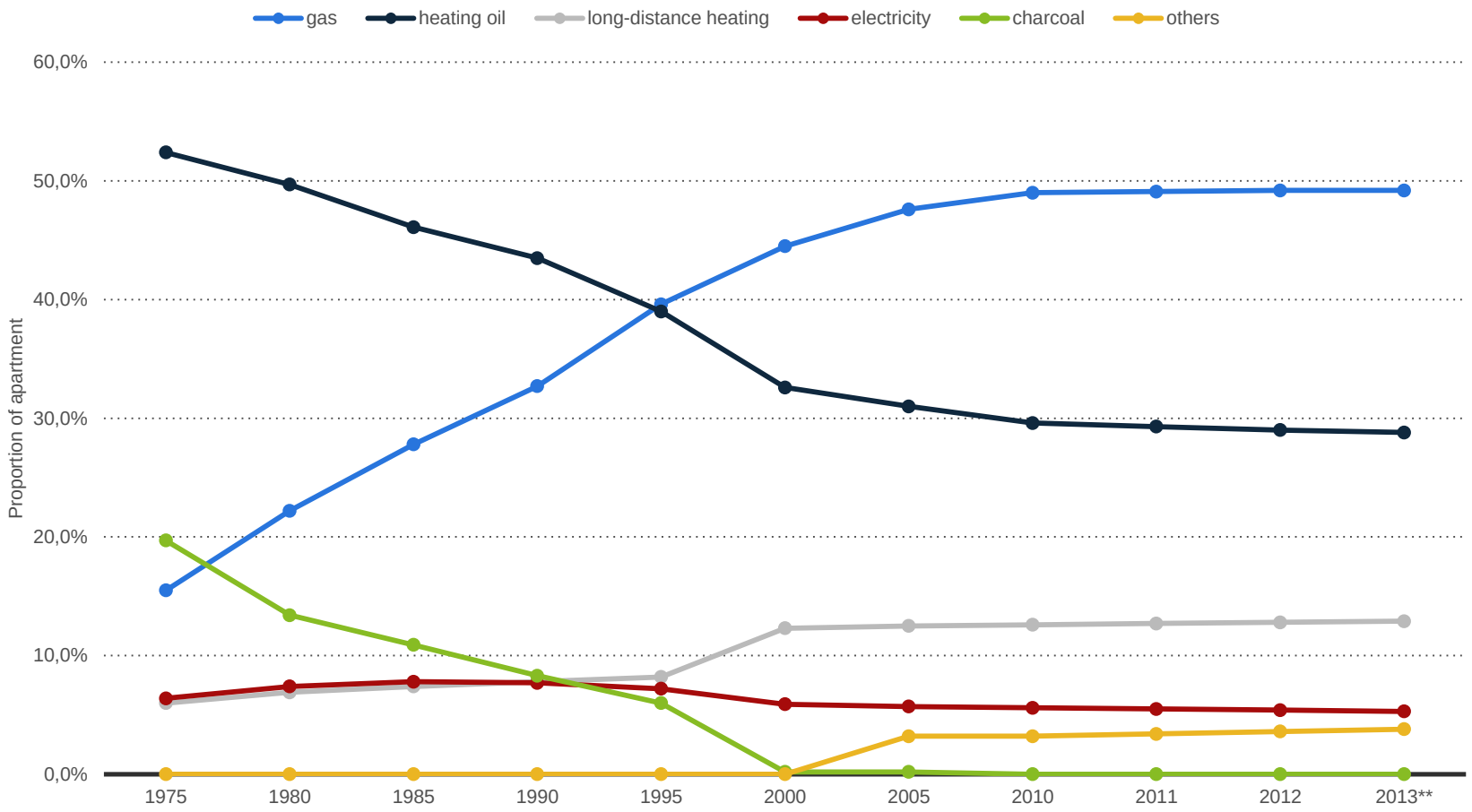
Heating Systems – average age of German rented apartments 2014

Age of the heating systems in German rented apartments in the Year 2014



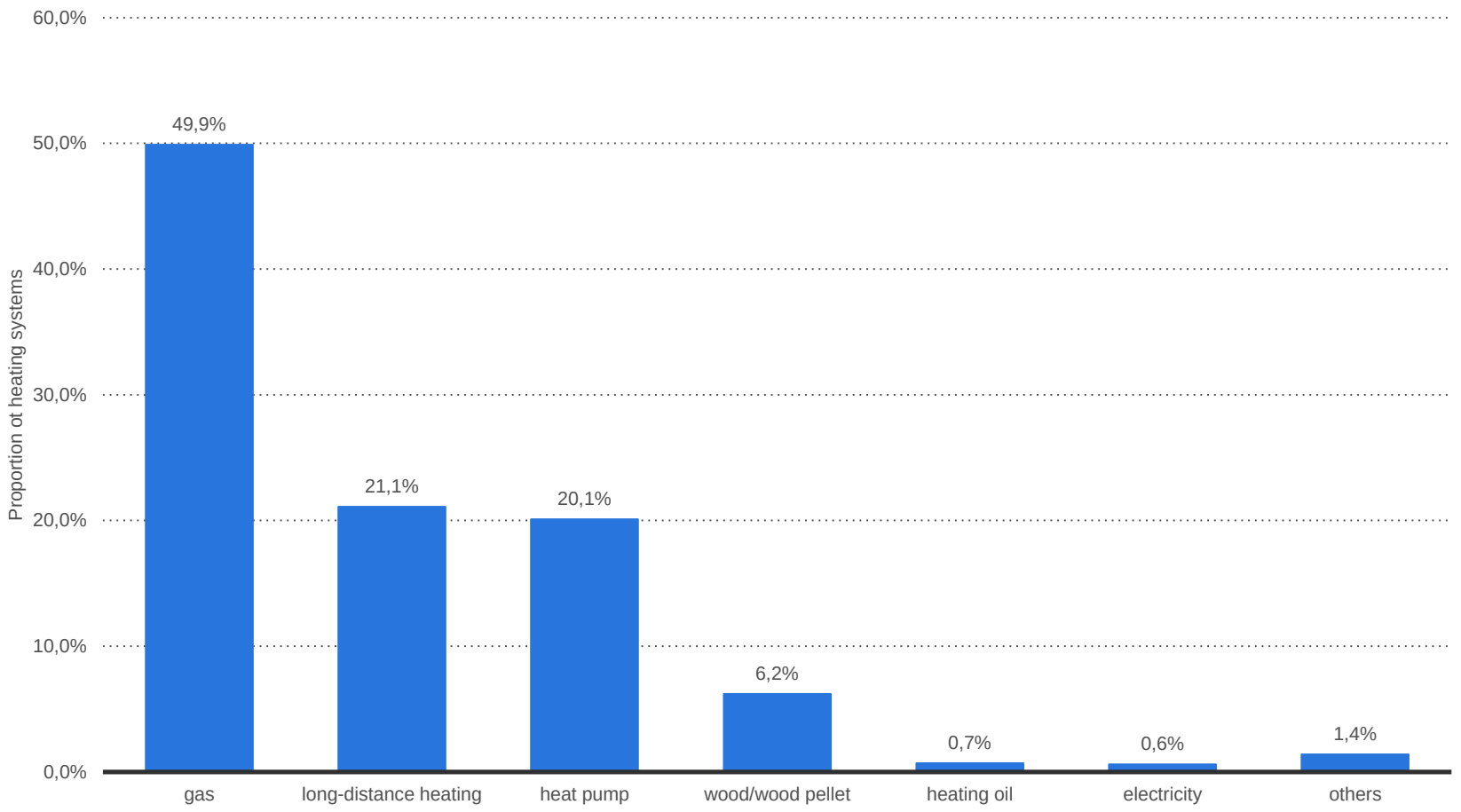
Living space – Heating structure in Germany 2013

Heating structure of living space in Germany



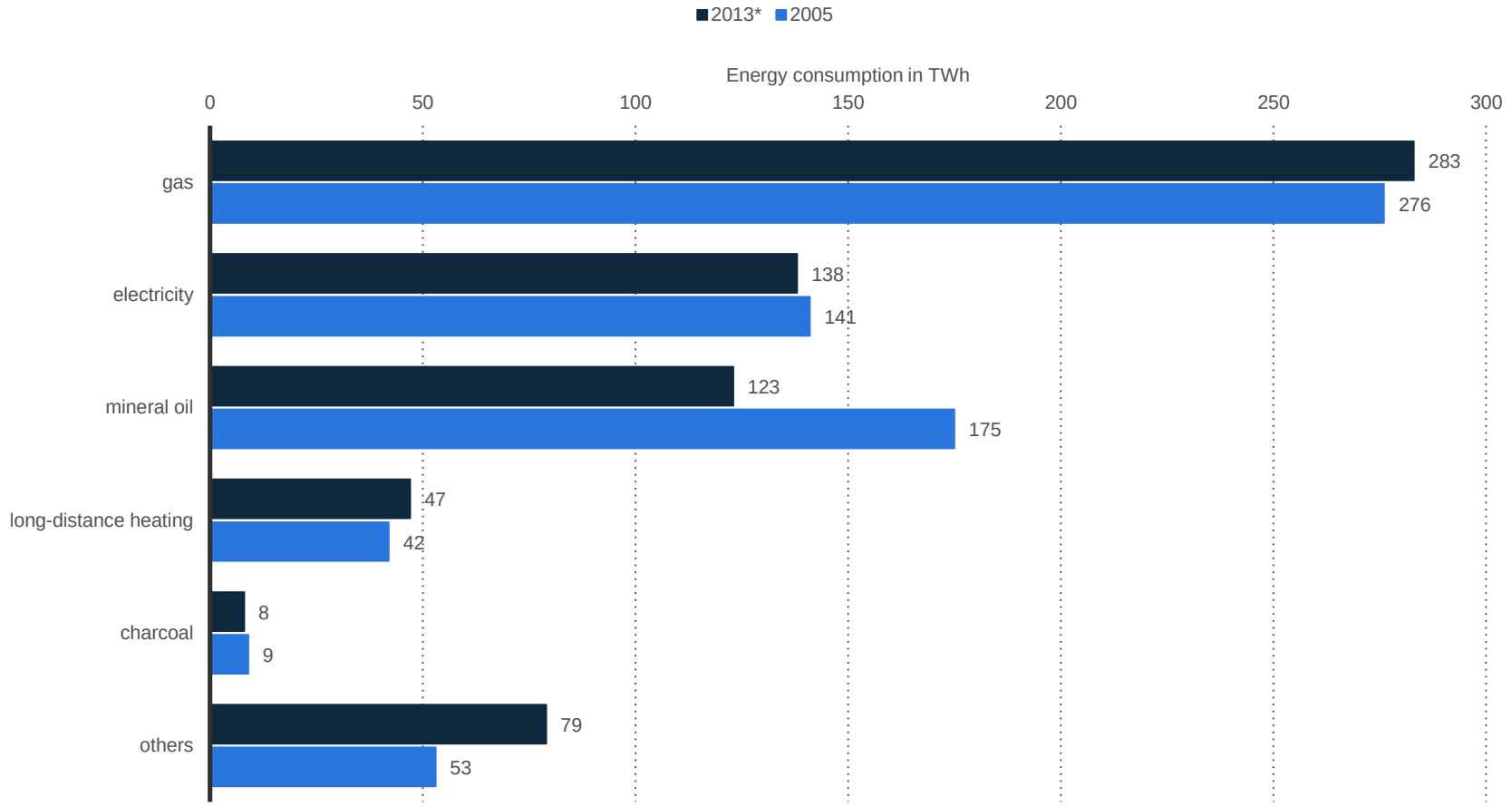
New-building-apartments – proportion of heating systems in Germany 2014

Proportion of heating systems at new-building-apartments



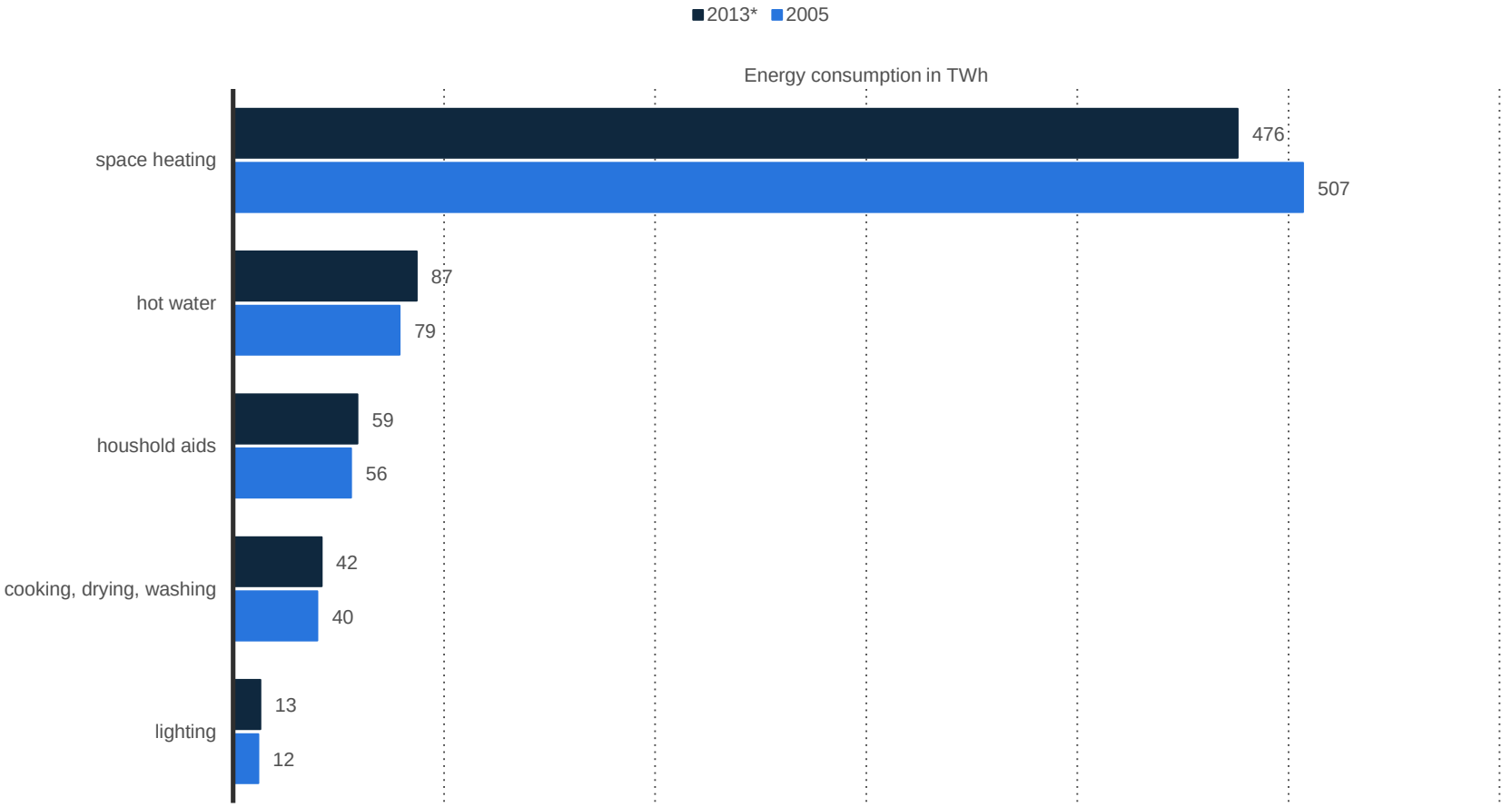
Private household – Energy consumption depending on energy source in Germany 2013

Energy consumption of private households at annual comparison between 2005 and 2013



Private housholds – energy consumption depending on application area in Germany 2013

Energy consumption of private households depending on application area at annual comparison between 2005 and 2013



Förderpolitik Energieeffizienz Deutschland
LEAF

Fazit

Bei keinem der 3 vorgestellten Objekten (Berlin und NRW) wurden Fördergelder beantragt.
Erklärung der Hausverwalter: Aufwand zur Beantragung nicht rentabel, steht nicht in annehmbarer Relation zum Vorbereitungsaufwand und dem Ergebnis.

Empfehlungen Politik

- Verbesserung Antragsverfahren
- Gesetzgebung WEGs zu revidieren, besonders die 30 %-ige Umlage der Heizungskosten auf alle Eigentümer anteileig bzgl. der Wohnfläche
- Verbesserung der Kreditpolitik für WEGs – juristische/physische Personen

MACHEN SIE MIT!!!

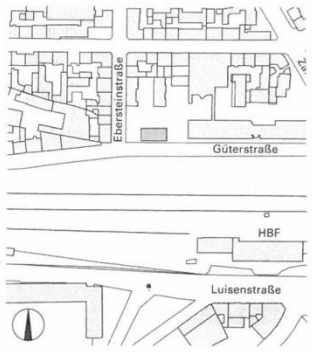
Forschungs-/Praxisprojekt Smart Home

- Fraunhofer IBP + Industriepartner
- Schimmelpilzvermeidung
- 30 – 40 % Heizkostenreduzierung
- 150 Euro / Wohneinheit Schutzgebühr für das Smart Home System, das mehrfach teurer ist

Förderpolitik Energieeffizienz Deutschland
Fallbeispiel Pforzheim

Foto: Dietmar Strauß

Der Altbau besteht aus ausbetonierten Hohlsteinen. Seine alten Balkone wurden abgenommen und das Hochhaus erhielt einen Mantel aus hochgedämmten Betonfertigteilen



Lageplan, M 1:5000

Die Wohnungen im neuen, durch eine Aufstockung entstandenen Dachgeschoss liegen deutlich hinter der alten Gebäudekante, was deren Terrassenfläche beträchtlich vergrößert

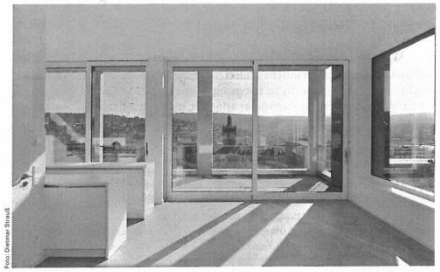
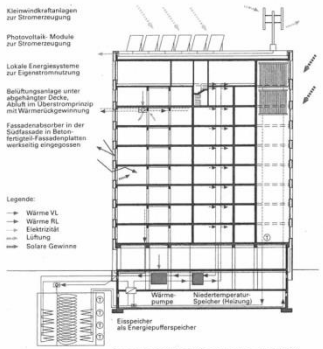
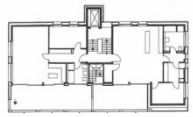


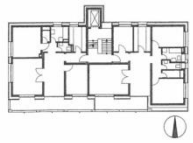
Foto: Dietmar Strauß



Querschnitt/Funktionsschema, M 1:500



Grundriss Dachgeschoss M 1:500



Grundriss Regelgeschoss 1-8, M 1:500

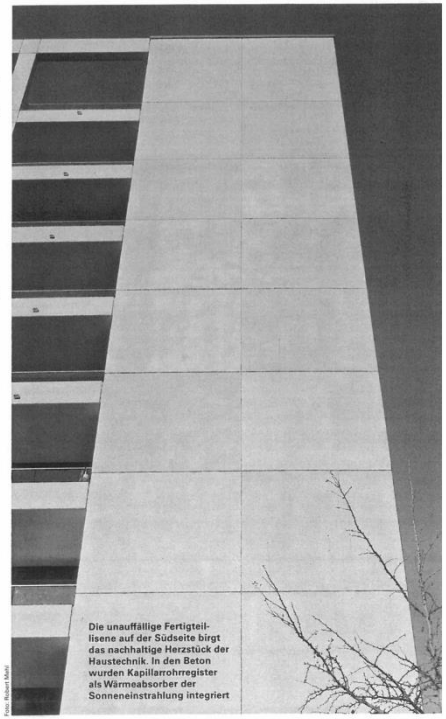


Foto: Robert Mohl

Die unauffällige Fertigteillisene auf der Südseite birgt das nachhaltige Herzstück der Haustechnik. In den Beton wurden Kapillarrohrregister als Wärmeabsorber der Sonneneinstrahlung integriert

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Förderpolitik Energieeffizienz Deutschland
Fallbeispiel Pforzheim

Renovierung mit Fördergeldern

Ein 1970 erbautes Gebäude wird renoviert. Es besteht aus 16 Betriebswohnungen mit jeweils 80-90m² Wohnfläche. Die Renovierungsmaßnahmen sind:
Anbringung einer hocheffizienten Wärmedämmung, mit Kapillarrohrsystem in den Betonfertigteilen
Rückbau der bestehenden Balkone zur Glättung der Gebäudeoberfläche
Deckenheizung mit mechanischer Belüftung
Ventilatoren zum Wärmeaustausch und Zulufttemperierung mittels Abwärmenutzung
In den Wohnräumen wird die Luftwechselrate der Zonen durch Türschlitze realisiert
Thermische Nutzung der Sonnenenergie und Speicherung mittels Eisspeicher
Anbringung einer Kleinwindkraftanlage mit 5 kW Leistung
Die gesamten Baukosten belaufen sich auf 2.865.000 € und wird unterteilt in:
KG 300 (brutto) 1.842.000€
KG 400 (brutto) 601.000€
KG 500 (brutto) 75.000€
Hauptnutzfläche: 1,459 €/m²
Die folgenden Energiedaten wurden aufgelistet:
Primärenergiebedarf: 20,07 kWh/m²a nach EnEV
Endenergiebedarf: 8,4 kWh/m²a nach EnEV
Jahresheizwärmebedarf: 14 kWh/m²a nach PHPP
Nach den Renovierungsarbeiten ergaben sich folgende bauphysikalischen Werte:
U-Wert Außenwand: 0,099 W/(m²K)
U-Wert Bodenplatte: 0,190 W/(m²K)
U-Wert Dach: 0,089 W/(m²K)
U_w-Wert Fenster: 0,98 W/(m²K)
Luftwechselrate n_{50}: 0,925 h^{-1}
Das Bauobjekt wurde mit dem Preis „Nachhaltiges Bauen“ der Deutschen Gesellschaft für Nachhaltiges Bauen (DGNB) ausgezeichnet. Die Unterstützung durch Fördergelder wurde durch die KfW (Kreditanstalt für Wiederaufbau) getätigt. Das Gebäude bekam zinsgünstige Kredite als Null-Zins-Anleihe. Dazu kam noch ein Teilschuldenerlass pro sanierter Wohnung, aufgrund von Nachhaltigkeitskriterien in Höhe von 300.000€

1950 – 80s concrete blocks / pre-fab

Germany

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Fallstudien

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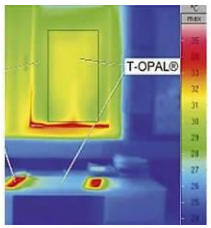



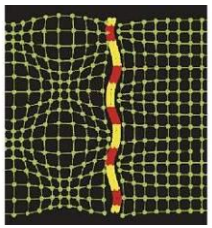


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Case Study Berlin

Berlin - Hansaviertel,

Bartningallee 16

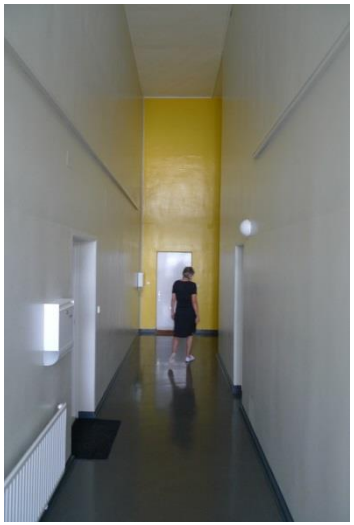
Built in 1957, listed building

Architect Hans Schwippert

60 Flats

Fraunhofer IBP

Case Study Berlin



- 2-story flats
- Facade = energetic desaster, bur protected (listed building)
- Thin concrete walls
- Large glass surfaces
- Large unused roof area
- New heating system in the cellar
- District heating

Case Study Berlin

Case Study Berlin

- Keine Wärmedämmung, da Denkmalschutz
- Angedachte Installation von Smart Home System

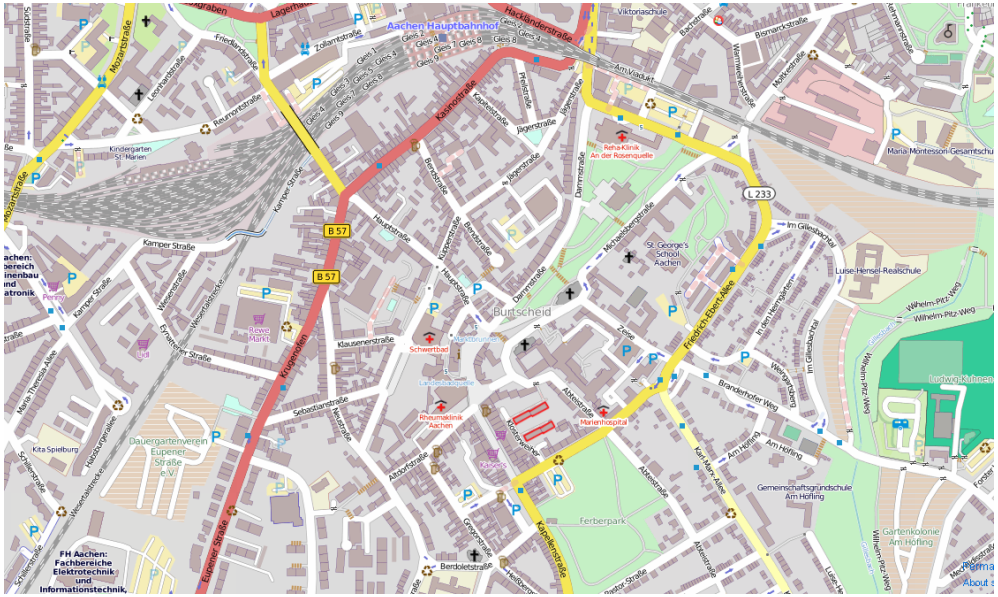
Case Study Aachen

Aachen- Burtscheid,

Klosterweiher 2-14

Built in 1970

60 Flats



Fraunhofer IBP

Case Study Aachen

Case Study Aachen

Problems

- Non-insulated inner walls flat/staircase
- Large glass surface in the staircase area
- Non insulated basement ceiling
- Non insulated roof ceiling
- Large garden area owned

Perspectives

- Cogeneration
- Insulation in the problematic building areas
- Solar energy usage – thermal and electric
- District heating

Case Study Aachen

Roof warm loft insulation is planned for the next year, in order to reach the required energy efficiency by the national regulations. An extraordinary full owner community meeting will be scheduled for November 2014, to take decision by the owner community. I should be there.

Case Study Aachen

- 10 cm XPS Wärmedämmung im Deckenbereich Dachstuhl, mit Trittschutz
- Dämmung Decke Treppenhaus
- Glassteinfassade in den nächsten 10 Jahren auszutauschen mit einer modernen Glasfassade
- Ergebnis:
  - 180.000 Euro Kosten für die thermische Bestandsoptimierung bei 60 Wohnungen
  - Energieeffizienzsteigerung – Ergebnisse sind noch zu messen
  - Komfortsteigerung
  - Kaltes Dach

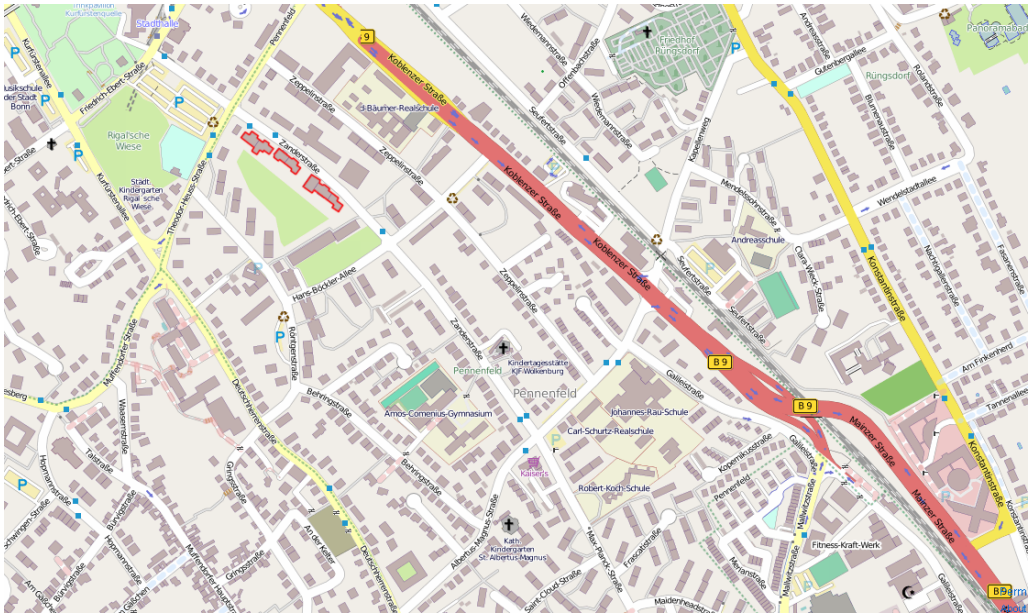
Case Study Bonn

Bonn - Bad Godesberg,

Zanderstraße 2-14

Built in 1970

59 Flats



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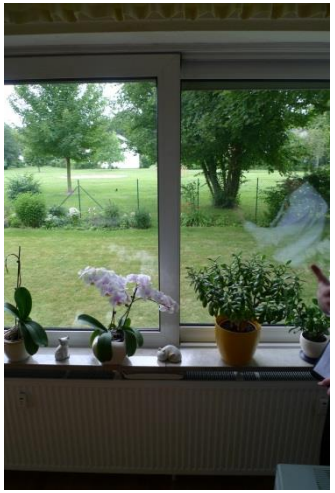
Case Study Bonn

The facade

The housekeeper

Heating system



The facade inside

Case Study Bonn

- Large glass surfaces in the facade area
- Old heating system
- Not any kind of insulation in the facade area
- Very thin walls behind the heating radiators
- Average age of the owners – over 65 (former residents since it was built)
- Non insulated cellar ceiling over the underground garage
- Decision for the energetic refurbishment of the cellar area

Case Study Bonn

New gas central heating will be installed in the complex. It has been discussed also about installing a pellet heating system, the idea was mainly supported by the investors in the owner community (owners of more than one flat in the complex, who rent their flats). The reason was, that the start invest would be higher than the one for the gas heating system. About 60 % of the flats in the complex are owned by owners, who live there and own one flat each. In connection to the heating system exchange, the owners are thinking about smart heating control by individual room climate based valves. For both actions they became from our team a lot of explanations and recommendations during their last Annual Full Owner Community Meeting and the time after.

Case Study Bonn

- Dämmmaßnahmen vor 10 Jahren
- Anfangs: angedachte Pelletheizung, im letzten Sommer aber Entscheidung für Gasheizung
- Halbierung der Heizenergiekosten
- Nachdem Smart Metering eingeführt wurde: Den Eigentümern wurde bewusst, dass Wohnungen an den Gebäudeecken/am Dach einen deutlich höheren Energieverbrauch haben, als diese „in der Mitte“


Thank You for Your attention!


Questions?