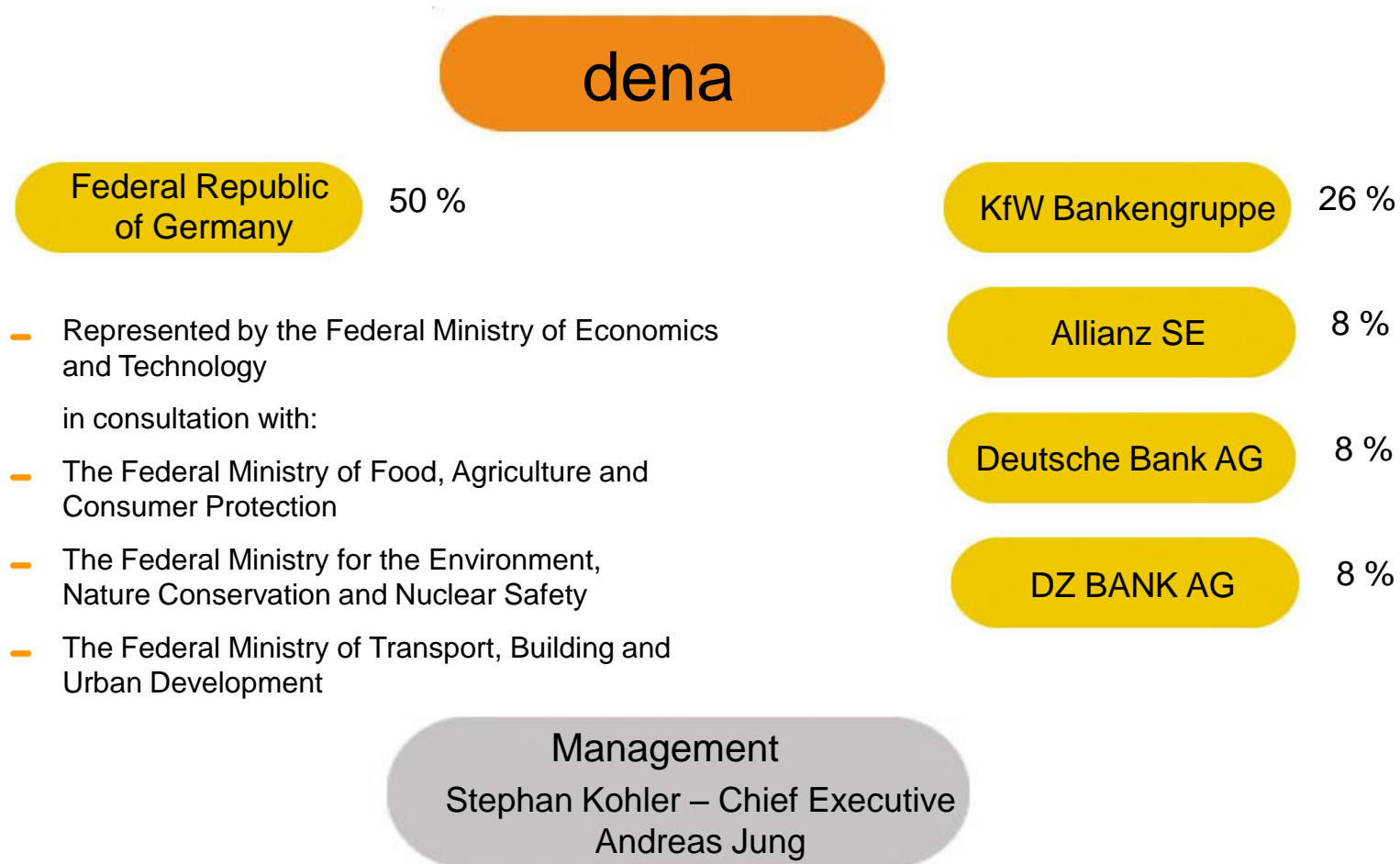


Felicitas Kraus, Head of Division „International Cooperation “

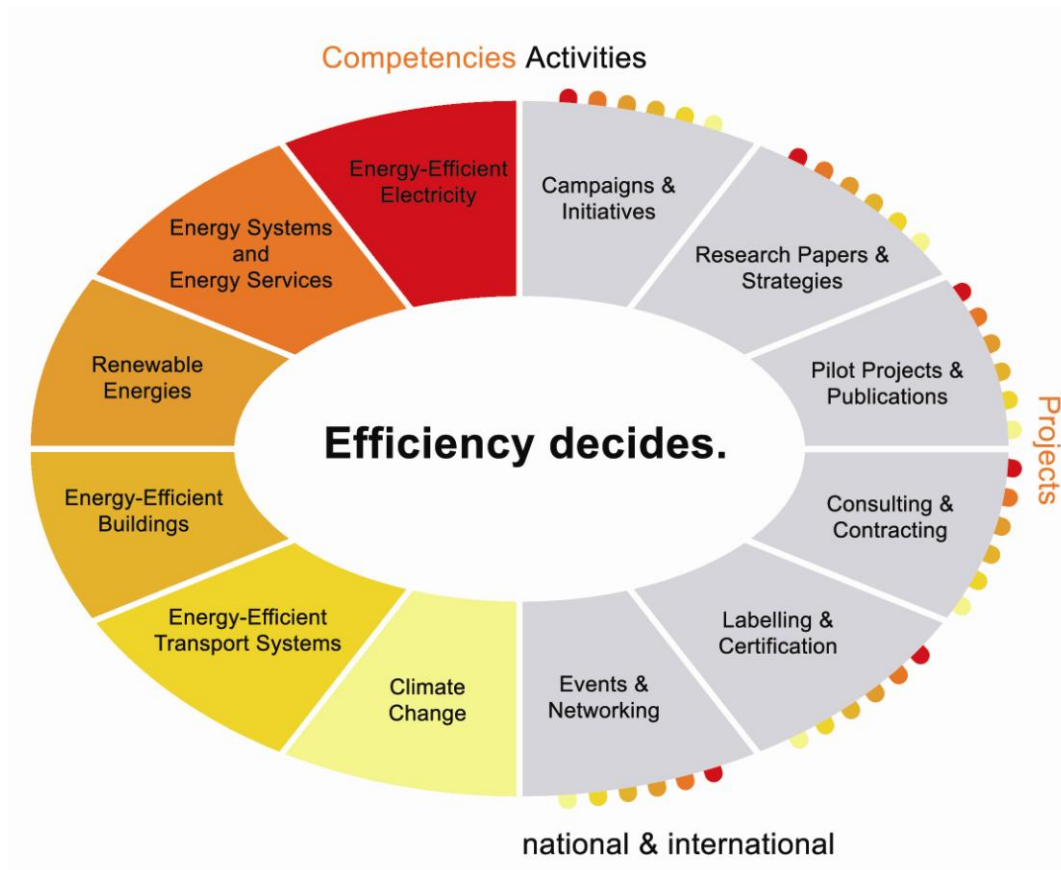
## Pilot Project „Efficient Homes“

Paris, 02.02.2011

## Ownership structure of dena.



# Dena's Fields of Competence and Operating Divisions.



Energy-Efficient Buildings

Energy-Efficient Electricity

Energy-Efficient Transport Systems

Renewable Energies

Energy Systems and Energy Services

International Cooperation

## German Energy Agency (dena) – Main reasons why dena was founded by the German government.

Dena's roles are

- Center of Excellence
  - Build up and disseminate know-how
  - Provide advice and assistance to the federal government
- Center for information campaigns and market preparation
  - Develop and promote new market instruments
  - Support promotional programmes
- Network supporter
  - Establish and accompany networks of key market player
  - Connect regional and national activities

**dena is the missing link between government, promotional programmes and market activities**

# Energy Efficiency in Buildings: Objectives, Potentials and Strategies.

## Basic figures of the german building stock

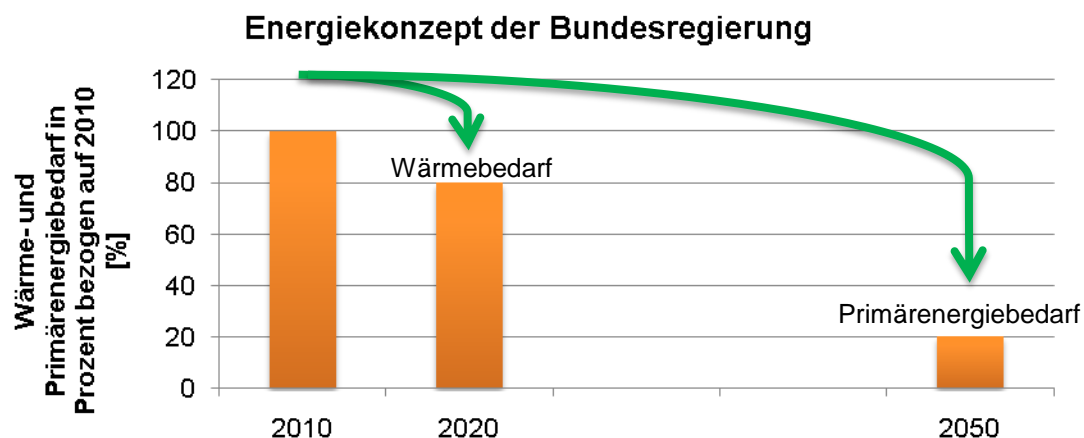
- 17,8 Mio. buildings
- 40% were built between 1948-1978
- 14 Mio. 1- or 2 family-houses.
- New building rate less than 1% p.a.
- Renovation rate 1% per year.

## German Federal Government's energy policy objectives.

- Germany reached its Kyoto targets (-21%) in 2010.
- Energy concept to 2050 – Central objectives:
  - Reduction in greenhouse gas emissions of 40% by 2020 and 80% by 2050 (compared with 1990)
  - Reduction in primary energy consumption of 20% by 2020 and 50% by 2050 (compared with 2008)
  - Increase in energy productivity of 2.1% on average
  - Reduction in electricity consumption of 10% by 2020 and 25% by 2050 (compared with 2008)
  - Increase in share of renewable energy in gross final energy consumption to 18% by 2020 and 60% by 2050
  - Share of power generation from renewable energy in gross final electricity consumption: 35% by 2020 and 80% by 2050

## Energy Efficiency in Buildings plays a major role in germans Energy Strategy

1. Building stock shall become nearly climate neutral until 2050.
2. **Heat demand** of buildings shall decrease at **20% until 2020**
3. **Primary Energy demand** shall decrease at **80 % until 2050**
4. **Double renovation rate** (from 1% to 2% p.a.)
5. **Increase the share of renewable heat** significantly.





## Strategy for the Building Sector – Three Main Columns.

### Energy Efficiency

#### Legal min. Requirements

- Energy Saving Ordinance (EnEV 2009)
- Act on the Promotion of Renewable Energies in the Heat Sector
- Decree on Heat

#### Responsibility:

- Federal Ministry
- “Länder”



#### Promotional Programmes

- National KfW Promotional programmes
- Market incentive programme for renewables

#### Responsibility:

- KfW
- BAFA, Regional Banks



#### Market Transformation/ Know-How Transfer/ QA

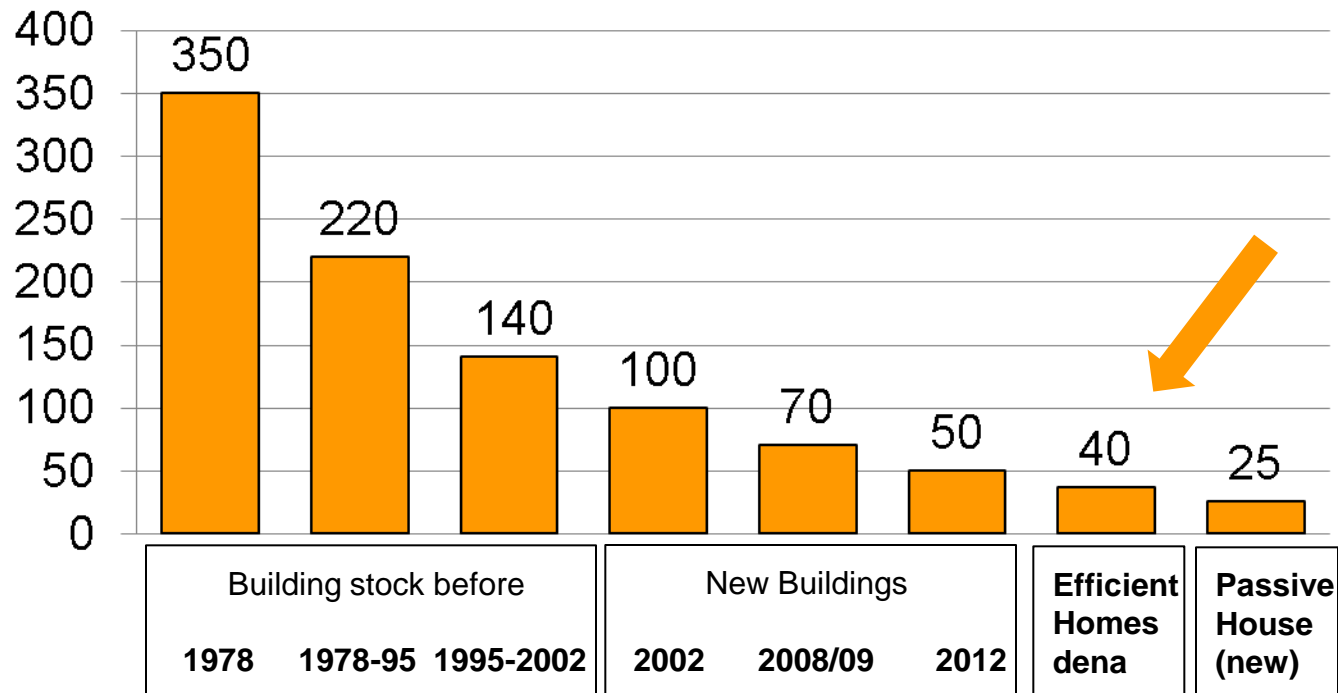
- Public relations
- Pilot projects
- Market instruments: Energy performance certificate (EPC) etc.
- Networking
- Know How Transfer

#### Responsibility:

- dena
- Regional energy agencies



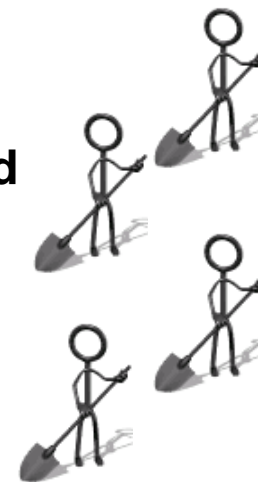
## Comparison of different energy standards for buildings.



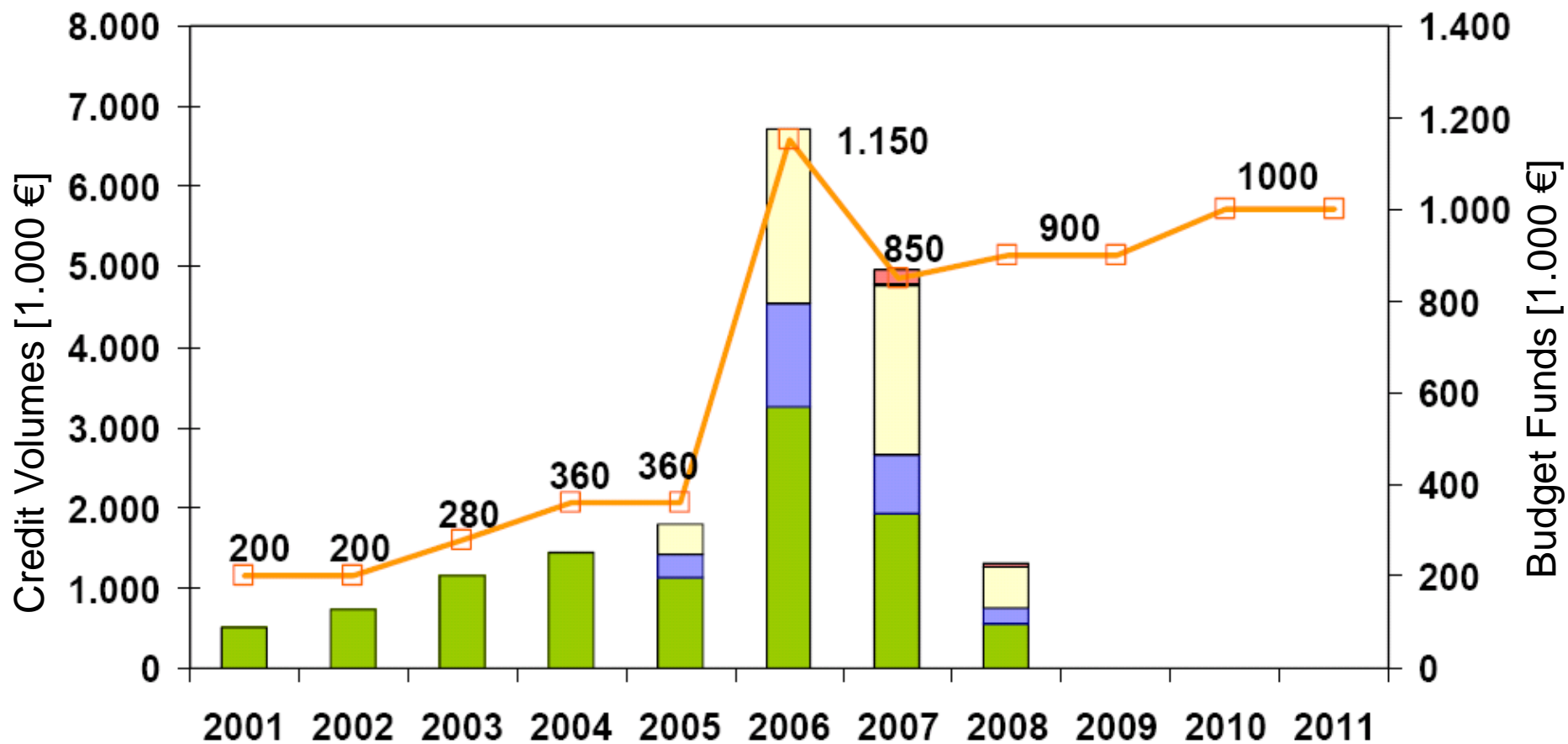
## The KfW Promotional Programm for Energy Efficient Refurbishments/New Buildings.

2006-2009.

- ~ 1,4 Mio. flats and ~ 630 municipal buildings have been refurbished / newly built
- Volume of the loan and grant: ~ 27 bn.€
- Total amount of governmental money ~ 6 bn.€
- ~ 290.000 places of employment have been saved/created  
→ mostly in middle-class construction and building industry
- Reduction of CO<sub>2</sub> Emission/year: > 4 Mio. tonnes / year
- Reduction in heating costs: ~1 bn.€ / year



## National Subsidies.



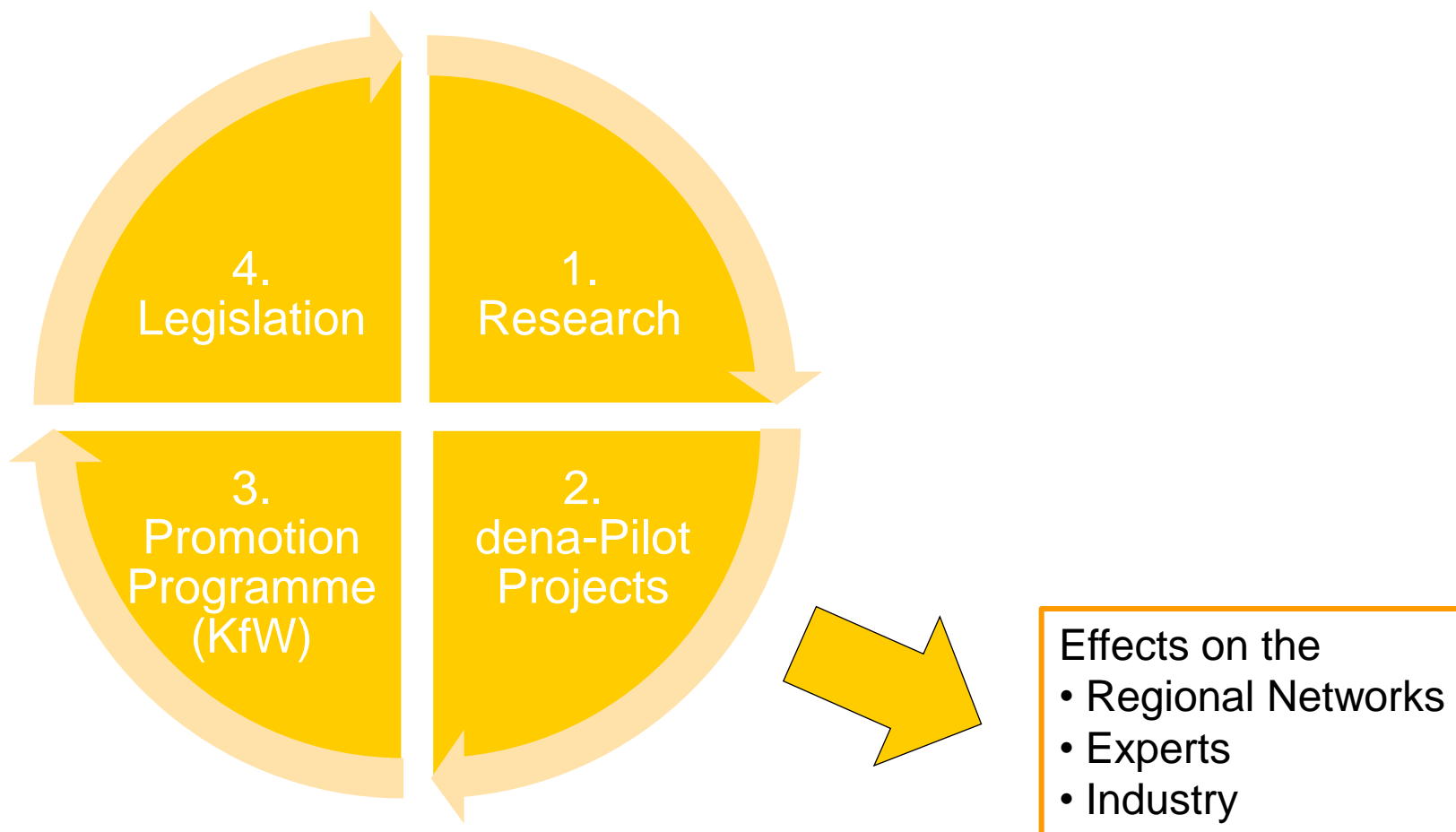
## Results of the Funding.

Year	Credits		Investments	Jobs
	Quantity	Volume		
2006	265.000	17 Bill.	> 28 Bill.	500.000
2007	220.000	16 Bill.	> 24 Bill.	440.000



## The Project „Efficient Homes“.

## System: Four Steps for Improving the Regulations.



## Success story: dena is preparing the ground for new national standards and promotional programmes.

**2003: dena project:** Pilot project to test energy standards for the refurbishment

> 400 buildings



**2007::** Energy standard get accepted by the national **promotion programme (KfW Bank)**

More than 10.000 buildings



**2009: Legal requirements**

Implementation of the standards within the Energy Saving Ordinance (EnEV 2009)





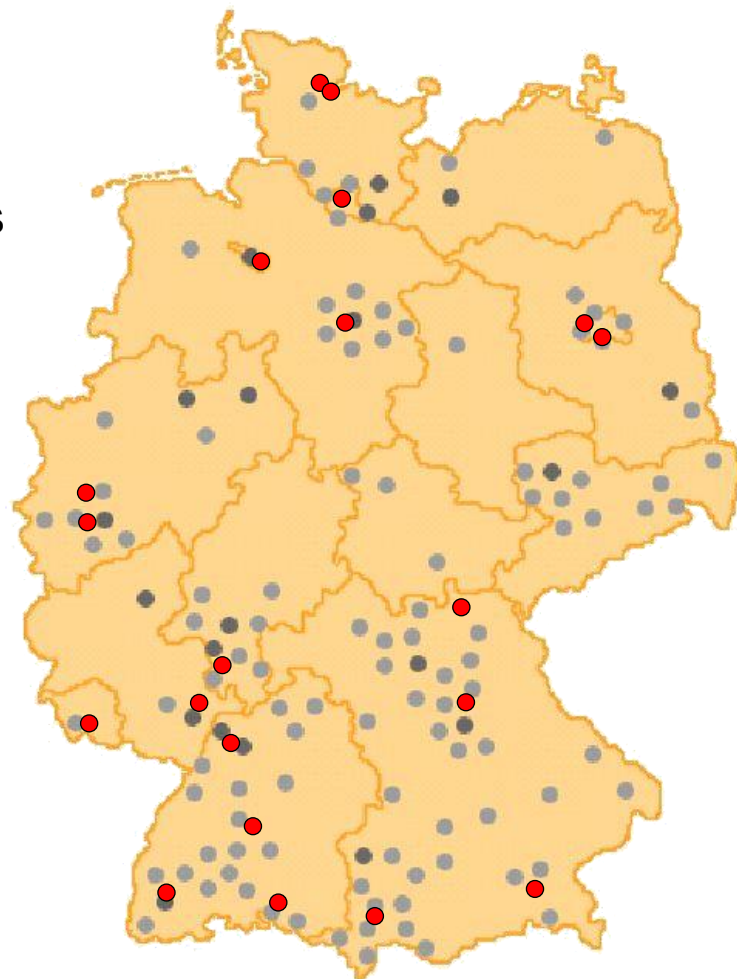
## Projekt „Efficient Homes: Low energy building for existing houses“.

Targets - Project „Energy Efficient Homes“:

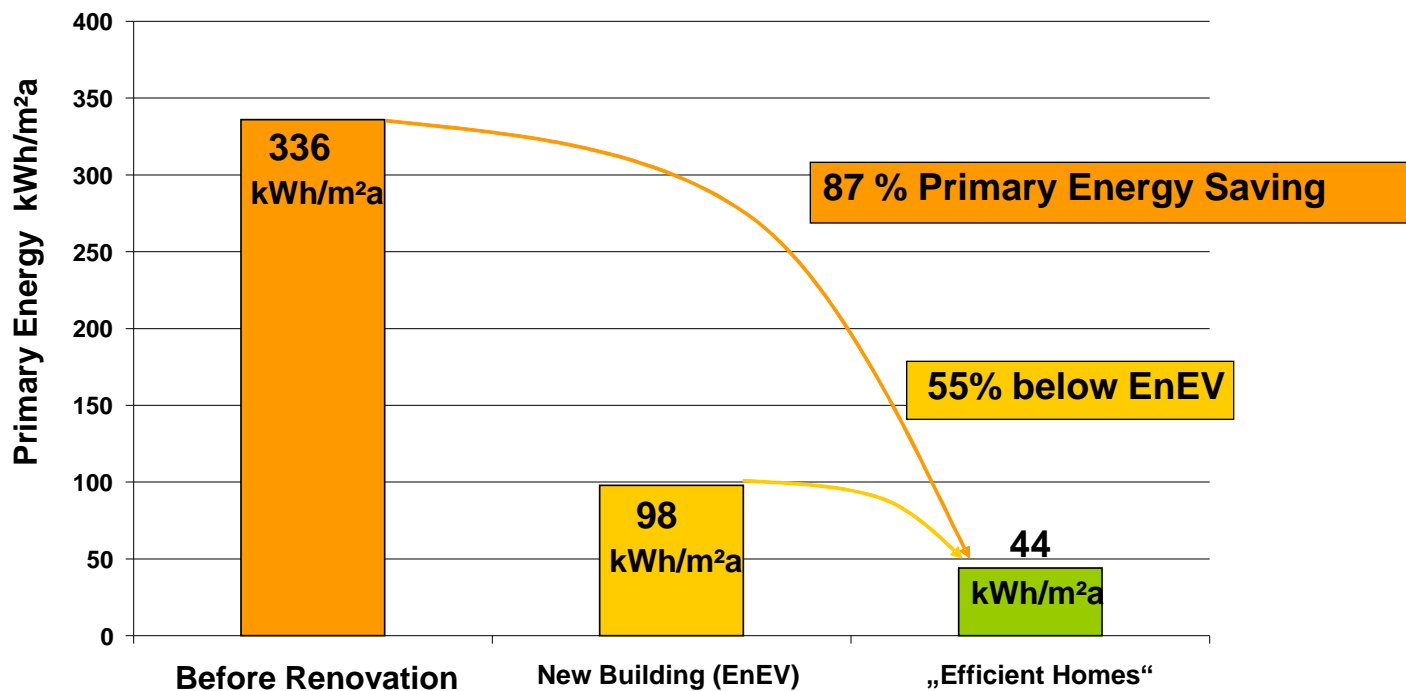
- Develop and test quality standards
- Disseminate Know How to regions and experts
- Realise and promote best-practice projects
- Build regional experts networks and raise qualification.

Since 2003:

- More than 400 buildings (residential and non-residential) have been refurbished
- Average reduction: ~88% primary energy demand



## Deep Renovations with Factor 10.



# High-Performance-Retrofitting: more than 400 high efficient buildings all over Germany.

All building types and construction periods included



Multi family dwelling  
Pforzheim  
Year of construction 1951

before: 358 kWh/m<sup>2</sup>a  
after: 31 kWh/m<sup>2</sup>a  
reduction of 92% primary  
energy



Single-family home  
Oldenburg  
Year of construction 1890

before: 462 kWh/m<sup>2</sup>a  
after: 21 kWh/m<sup>2</sup>a  
reduction of 95% primary  
energy



heritage building in  
Eichstetten  
Year of construction 1750

before: 202 kWh/m<sup>2</sup>a  
after: 22 kWh/m<sup>2</sup>a  
reduction 89% primary  
energy

## „EfficientHome“ in Leipzig.



	Before refurbishment	After refurbishment
primary energy demand	184 (kWh/m <sup>2</sup> a)	44 (kWh/m <sup>2</sup> a)
→ energy savings: 76 %		
rent	3,12 €/m <sup>2</sup>	4,70 €/m <sup>2</sup>
vacancies	40 %	Waiting list

## „EfficientHome“ in Berlin – Ermannstreet 20.



- Year of construction      1886
- End of modernisation      1 / 2009
- 655 m<sup>2</sup>
- 6 dwelling unit
- Primary energy demand  
after modernisation      32 kWh/m<sup>2</sup>a  
-> savings      88 %

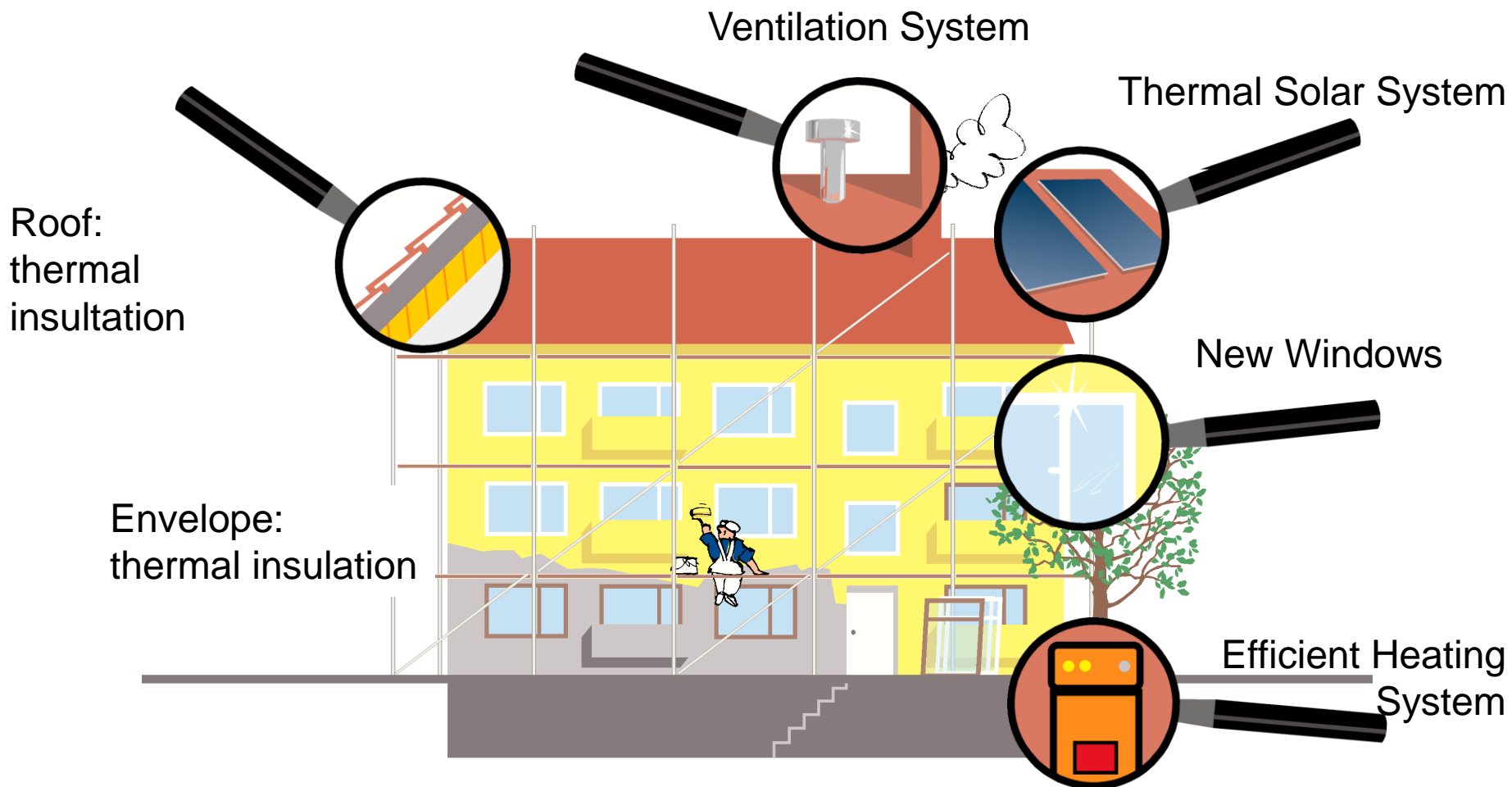


## „EfficientHome“ in Cologne – Town House.



- Year of construction            1929
- End of modernisation        July 2007
- 162 m<sup>2</sup>
- 1 dwelling unit
- Primary energy demand  
after modernisation            57 kWh/m<sup>2</sup>a  
-> savings                            74 %

## Measures in Efficient Homes.



## Possibilities how to reach the Low-Energy-Standard.

Component	before refurbishment	measures taken	after refurbishment
exterior walls	1,27 W/(m <sup>2</sup> K)	15-30 cm insulation	0,20 W/(m <sup>2</sup> K)
roof	0,97 W/(m <sup>2</sup> K)	20-40 cm insulation	0,17 W/(m <sup>2</sup> K)
basement ceiling	1,19 W/(m <sup>2</sup> K)	10 cm insulation	0,28 W/(m <sup>2</sup> K)
thermal bridges	0,10 W/(m <sup>2</sup> <sub>surface area</sub> K)	standard measures	0,05 W/(m <sup>2</sup> <sub>surface area</sub> K)
windows	3,20 W/(m <sup>2</sup> K)	two-pane-heat-insulating glazing, conventional windows	1,1 W/(m <sup>2</sup> K)
ventilation	natural ventilation	ventilation with heat recovery	system efficiency > 80 %
heating systems	steady temperature boiler	new boiler, regulated pumps	condensing boiler



## Costs

- Total costs of the measures (including not energy-related measures): 300 – 450 € per m<sup>2</sup>
- Additional costs (compared to business as usual renovation) 80 € - 250 €
- Lower costs in big apartment buildings (prefabricated high-rise buildings), higher costs in small and ancient buildings.
- :Return on investment dependend on future energy-prices, ownership structure beetween 12 – 20 years.

## Lessons learned: Barriers.

Dena has identified six main reasons for not realising refurbishment measures:

1. **Complexity** of the refurbishment process and **lack of reliable results**
2. Lack of **trust** in involved parties/experts
3. Experts: Lack of **qualification**
4. Lack of market **transparency**
5. Building owner: Lacks of **actual information**
6. Difficulties to **finance** the refurbishment measures (Owner)

## New quality seal for Energy Efficient Buildings.

- for the first time: introduction of a broadly based quality standard for energy efficient residential buildings in Germany

- objectives

- introduction of a **reliable and consistent quality standard** for new and existing buildings
- make energy efficient buildings **visible in the public**
- **establish a marketing instrument** for energy efficient buildings
- **promote both demand and offer** of energy efficient buildings



## Introduction of the new building label for Energy Efficient Buildings.

- Has been developed by dena in co-operation with the Federal Ministry of Transport, Building and Urban Affairs and KfW promotional bank
- About 1.000 Efficient Buildings available from the start as a result of 2 competitions dena performed in 2008/2009
- Will be available on the market around autumn 2009 in parallel with tightened legal requirements (EnEV 2009)



# experts register – dena’s achievements working towards EPBD requirements.

- **new expert register including:**
    - list of qualifications
    - indication of reference buildings
    - logo of the company and description of services
  - **new form of search:**
    - different criterias such as: planning, energy performance certificate, energy consultancy...
    - experts of quality seal „efficient building“ listet on top
- ➔ enable formation of networks



## Results and lessons learnt

- Factor 10 renovations are possible with conventional and available materials and technologies.
- Rising request from housing companies, also from commercial developer.
- Governments can provide the necessary framework for the market introduction.
- Qualification of planners and craftsman are crucial for quality and sustainable success of the measures.
- Market instruments (certification schemes e.g.) are necessary to create transparency.
- Project helped, to change the building market and the quality of renovation in the mass market in Germany.

被动房标准  
Passive House  
standard



德国ENEV  
2007/2009 标准  
German standard  
under  
ENEV 2007/2009



中国新高效房  
等级

New High  
Efficiency  
China levels

金奖  
gold



银奖  
silver



铜奖  
bronze



现行中国标准  
Current Chinese  
standards



Thank you..

