Qualergy2020 – The German Project

BUILD UP SKILLS - The EU Sustainable Building Workforce Initiative

Ljubljana, 11th to 13th June 2012
Objectives in the Energy Sector

Measures initiated in Germany:

• Germany strengthened its efforts
• Building sector: legislation, financial incentives, information
• Energy concept 2010, energy transition (Energiewende) 2011
  • Gradual phasing out of nuclear power until 2022 and
  • Accelerated shift to renewables and more energy efficiency
Political background

International agreements

1977-2012

INTERNATIONAL / EUROPE

1977

Klima-Rahmenkonvention (1994)

Kyoto (1997)

EPBD (2002)

EDL (2006)

EU-Directives

EPBD (2010)

Concepts EU

National climate protection program (2000)

Nationale Energiesparprogramm (2002)

National energy efficiency program (2007)

KfW-Förderung (2001)

NRP (2011)

IEKP Meseberg (2007)

EnEV und Energieausweis (2007)

Report D-EU

EnEV (2002)

EnEV (2009)

EnEV (2012)

EEG (2000)

EnEV WärmeG (2009)

Reports D-EU

NRP (2011)

Koalitionsvertrag (2009)

EnEV (2009)

EEG (2009)

EEG (2002)

Energiekonzept (2010)

Energiekonzept (2011)

Strategie EU 2020 (2010)

Energie- und Wärmeerzeugung (1977)


WSV

(1977)

EEG (2000)

Landesenergiekonzept (2000)

(2007)

Map (2000)

EnEV und Energieausweis (2007)

Nationale Klimaschutzprogramm (2005)

(2001)

Klimaschutzprogramm (2005)

Zielsetzung (2011)

1994

Klimarahmenkonvention (1994)

(1997)

Kyoto

EnEV und Energieausweis (2007)

Ljubljana, 11th-13th June 2012

2. EU-Exchange „Build-Up-Skills“
The challenge of transformation the german energy system

Carbon emissions 1990

-40%  -55%  -70%  -80% bis -95%

Primary energy demand 2008

-20%

Share of renewable energy sources for electricity in gross internal energy consumption

2020: 35%
2030: 50%
2040: 65%
2050: 80%
Targets of the German Energy Concept

1. Existing buildings should be nearly climate neutral by 2050

2. Heating demand of the building stock should be reduced by 20% by 2020 – primary energy demand by 80% by 2050

3. Retrofit rate should be doubled from 1% to 2.0%

4. The share of renewable energy should be increased significantly

5. A road map for deep retrofit by 2020 – 2050 will be developed
The German VET System

Analysis of the German vocational education and training system for construction workers

Basics of the German training system

- 3 to 3.5 years in the dual training system
- 45 relevant building and construction occupations (30 alone in the craft sector)
- Crafts: Advanced training to a “master of crafts” with over 1800 hours
- nationally regulated training regulations and master's certificate regulations
## Starting point: Development of a grid for the qualitative analysis

### Point of Reference: Buildings

<table>
<thead>
<tr>
<th>Building envelope</th>
<th>Advisory Services</th>
<th>Planning</th>
<th>Realisation</th>
<th>Approval</th>
<th>Maintenance and Repair</th>
<th>Disposal</th>
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<tbody>
<tr>
<td>Building shell</td>
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<td>Roof</td>
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<td>Facades</td>
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<td>Windows and doors</td>
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</table>

### Relevant technological sectors

<table>
<thead>
<tr>
<th>Infrastructure of buildings</th>
<th>Advisory Services</th>
<th>Planning</th>
<th>Realisation</th>
<th>Approval</th>
<th>Maintenance and Repair</th>
<th>Disposal</th>
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<tbody>
<tr>
<td>Interior fitting</td>
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<td>Electrotechnology</td>
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<td>Heat technology</td>
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<td>Ventilation and air conditioning</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Energy supply</th>
<th>Advisory Services</th>
<th>Planning</th>
<th>Realisation</th>
<th>Approval</th>
<th>Maintenance and Repair</th>
<th>Disposal</th>
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</thead>
<tbody>
<tr>
<td>Geothermal energy</td>
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<td>Biomass</td>
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<td>Solar Heat</td>
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<td>Photovoltaics</td>
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<td>Block heat and power plant</td>
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<tr>
<td>Wind engine</td>
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### The German VET System
The German VET System

Initial VET

- Identification and analysis of 45 relevant occupations within the building sector
- Systematic identification of qualifications in training regulations
- Further differentiation of the identified processes, e.g. planning:
  - Considering conditions
  - Planning procedure
  - Coordination with other involved

Continuing VET

- Systematic identification of qualifications in Master Craftsman regulations (31)
- Investigation of existing further training courses (survey)
  - Qualitative Analysis
  - Quantitative Analysis
  - Grid
    - Number of Participants
    - Training Hours
    - Examination Regulations
    - Admission Requirements
## Further differentiation of the grid

<table>
<thead>
<tr>
<th>Processes</th>
<th>Advisory Services</th>
<th>Planning</th>
<th>Realisation</th>
<th>Approval</th>
<th>Maintenance and Repair</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception of customer wishes</td>
<td>Customer information</td>
<td>Considering conditions</td>
<td>Planning procedure</td>
<td>Coordination with other involved</td>
<td>Preparatory work at the building</td>
<td>Preparation of the material</td>
</tr>
</tbody>
</table>

### The German VET System

**BUILD UP Skills**

The EU-funded project building-up skills in the field of energy efficiency and renewable energy.

Ljubljana, 11th-13th June 2012

2. EU-Exchange „Build-Up-Skills“

Seite 9
Quantitative analysis of continuing VET offers in Germany

- survey in the German crafts sector and in German industry
- around 300 different courses for renewable energies and energy efficiency in the German crafts sector and in industry
- more than 200 courses alone in the crafts sector
- focus on courses with
  - a) 5 to 50 hours and
  - b) 200 hours and more
Statistics on the building and the construction sector

The German building sector

- Goals in the building sector until 2020: analysis of residential and nonresidential buildings
  - approximately 18 million residential buildings (2.7 to 3.4 billion square meters space)
  - around 2.5 million non-residential buildings (2.2 to 2.7 billion square meters space)
German building sector

- approx. 40% end energy consumption and 30% of greenhouse gases (CO₂ equivalent)
- ≈ 20.5 million buildings
- 75% built before 1977; 90% below ENEV-2009 (German energy saving regulation) level
- Potential for energetic refurbishments with a high chance of fast energy savings, **700 PJ need to be saved**

German building construction sector

- Approx. 500,000 companies with 2.4 million employees, more than 80% of employees are qualified or highly qualified workers
Current situation of Germany‘s building stock: Level of energy efficiency still insufficient.

About 95% of all existing buildings have a higher energy consumption than new buildings (about 70 kW h/m²a)
Cut the energy demand – German energy saving ordinance

### Development of Energy-Efficient Construction

<table>
<thead>
<tr>
<th>Date</th>
<th>Ordinance</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.11.1977</td>
<td>Heat saving ordinance 1977</td>
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<tr>
<td>01.01.1984</td>
<td>Heat saving ordinance 1984</td>
</tr>
<tr>
<td>11.01.1995</td>
<td>Heat saving ordinance 1995</td>
</tr>
<tr>
<td>04.05.1998</td>
<td>Heating system ordinance</td>
</tr>
<tr>
<td>01.02.2002</td>
<td>Energy saving ordinance EnEV 2002</td>
</tr>
<tr>
<td>18.11.2004</td>
<td>Energy saving ordinance EnEV 2004</td>
</tr>
<tr>
<td>01.10.2007</td>
<td>Energy saving ordinance EnEV 2007</td>
</tr>
<tr>
<td>01.10.2009</td>
<td>Energy saving ordinance EnEV 2009</td>
</tr>
</tbody>
</table>

### Statistics

EnEV 2012 planned: 30% less than 2009
Relevant technologies and processes are available regarding: building shell; building infrastructure; energy supply

Technology leaps not expected until 2020

Feasibility of climate protection goals and objectives until 2020

- Increasing the share of renewable energy sources feasible due to national laws and regulations (EEG)
- Reduction of greenhouse gases (40%) feasible
- Reduction of energy consumption (20%) in the building sector not feasible without additional investments

The annual investment of €57.5 billion for refurbishment measures must be increased
Scenario considers type, construction year & energy demand to calculate total surface area [m²] for restoration actions as well as costs for replacement of installation engineering.

### Step 1: Definition of basic conditions for restoration
- 3.4 billion m² habitable surface
- 2.5 billion m² useable surface
- Residential before 1996
- Non-residential before 1977
- 50% of insulated buildings
- Demanded saving: 700 PJ

### Step 2: Classification/calculation for restoration to save 700 PJ

<table>
<thead>
<tr>
<th>1-/2-family house</th>
<th>surface area</th>
<th>energy use</th>
<th>impact</th>
<th>restoration area</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1949 non-isolated</td>
<td>389,966,400 m²</td>
<td>180 kWh/a</td>
<td>80,6 %</td>
<td>124,336,279 m²</td>
</tr>
<tr>
<td>&lt;1949 isolated</td>
<td>151,653,600 m²</td>
<td>90 kWh/a</td>
<td>61,1 %</td>
<td>25,932,766 m²</td>
</tr>
<tr>
<td>&lt;1979 non-isolated</td>
<td>621,057,600 m²</td>
<td>180 kWh/a</td>
<td>80,6 %</td>
<td>184,292,493 m²</td>
</tr>
<tr>
<td>&lt;1979 isolated</td>
<td>241,522,400 m²</td>
<td>90 kWh/a</td>
<td>61,1 %</td>
<td>41,300,330 m²</td>
</tr>
<tr>
<td>&lt;1996</td>
<td>361,080,000 m²</td>
<td>80 kWh/a</td>
<td>56,3 %</td>
<td>67,080,640 m²</td>
</tr>
<tr>
<td>&lt;2001</td>
<td>120,360,000 m²</td>
<td>50 kWh/a</td>
<td>30,0 %</td>
<td>0 m²</td>
</tr>
<tr>
<td>&gt;2001</td>
<td>120,360,000 m²</td>
<td>35 kWh/a</td>
<td>0,0 %</td>
<td>0 m²</td>
</tr>
</tbody>
</table>
Restoration and installation efforts sum up to costs in €/m²:
residential buildings: €500/m², non-residential: €380/m²

- €372.8 billion residential, €195.4 billion non-residential
- Total current investment of €57.5 bn./a for refurbishments must be increased to €81.1 bn./a to achieve 2020 goals

- Additional investment of €23.6 billion/a necessary (11 bn. in residential and 12.6 bn. Euros in non-residential)
Impact on labor markets

Analysis of labor supply and demand in construction occupations until 2020

Quantitative demand for skilled workers by 2020

- Benchmark scenario (projection of current trends without additional investment)
  - no nationwide shortage of skilled workers
  - increasing employment of older persons
  - higher labor force participation of women
Impact on labor markets

- **Alternative scenario** (modelled calculations for additional investments of € 23.6 billion a year (2014-2020))
  - consideration of all building trades: mathematically, the labor supply meets the demand
  - But: In some selected professions shortages may occur
    - electrical trades
    - Metal construction, plant engineering, steel construction, installation, assemblers
    - Regional differences cannot be mapped, but are very likely
  - From 2020 on there will be increasing nationwide shortages in the construction labor markets
Impact on labor markets

Labour demand and supply in building trades until 2020

- Economically active population (BIBB-DEMOS)
- Economically active population (BIBB-FIT)
- Labour force (IAB-INFORGE - benchmark scenario)
- Labour force (IAB-INFORGE - alternative scenario: additional investment in building sector of 23.6 million Euros p.a. from 2014-2020)
Impact on labor markets

Labor supply and demand of the building trades selected by benchmark and alternative scenario to 2020 within the three largest occupations

- Building trades, wood, plastics engineering
- Electrical trades
- Metal construction, plant engineering, steel construction, installation, assemblers

Labour force IAB-INFORGE (benchmark)
Labour force IAB-INFORGE (alternative)
Institutional Work

Meetings and events

• Kick-off-meeting 12.01.2011
• 3 consortium meetings
• Presentation of interim results 05.31.2012

National platform

• 56 suppliers (incl. consortium)
• from different types of society

Website www.bauinitiative.de
Initiative zur Ausbildung und Qualifizierung von Arbeitskräften im Bausektor in den Bereichen Energieeffizienz und Erneuerbare Energien

Hintergrund
Was macht die Europäische Bauinitiative – Build Up Skills Deutschland?

Mehr über Build Up Skills erfahren...
Thank you for your attention!