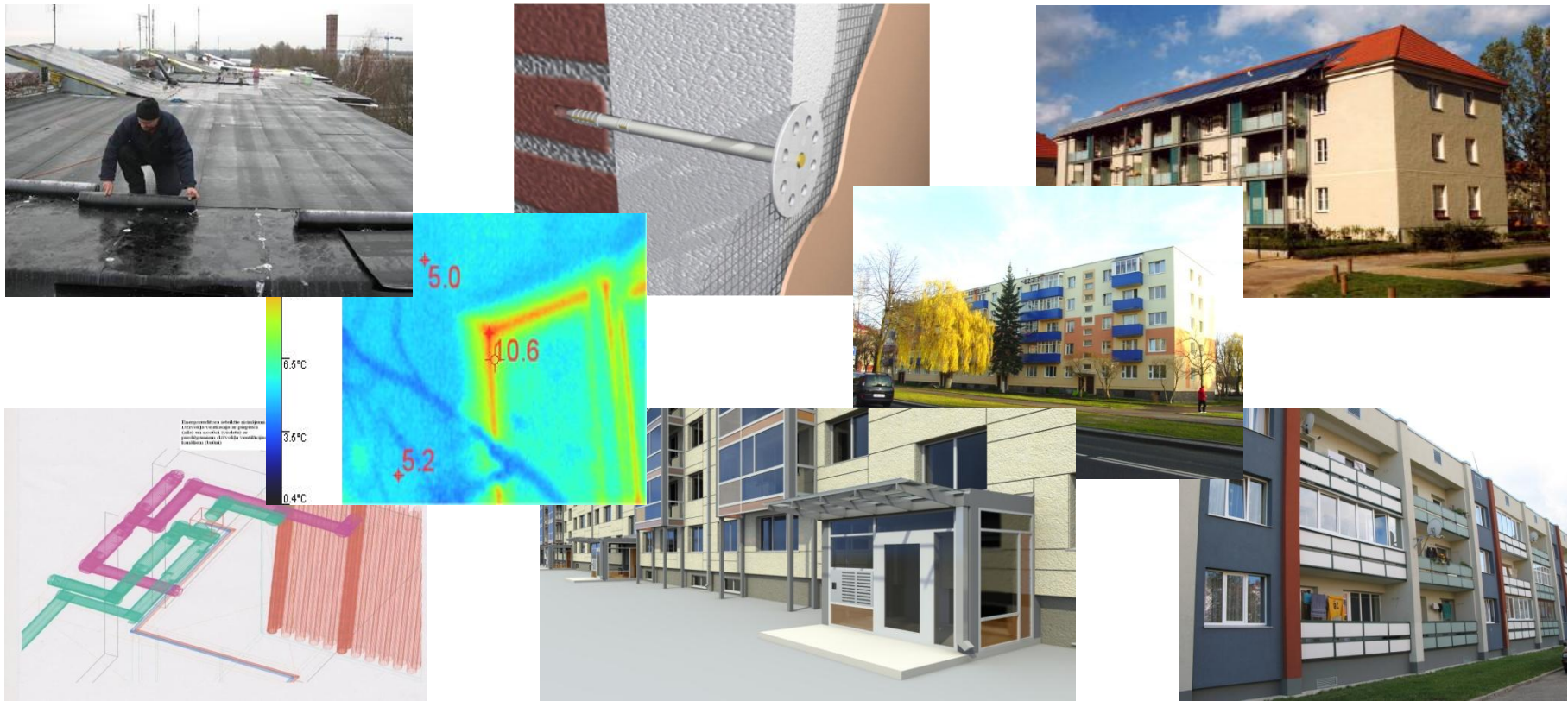


Workpackage 4

- Energy Efficient Renewal of Housing - Improvement of Buildings and Energy Supply Infrastructure



Structure

1. Background WP 4
2. Objectives WP 4
3. Recommendations from the Target Areas
4. Projected Integration of Renewable Energies (optional)
5. Upcoming activities of the Potsdam CCI (optional)

1. Background

WP 3 Urban Development

Urban Development Strategy (City Level)

Downscaling

WP 4 Energy Supply

Energy Strategy (District Level)



End of URB.Energy

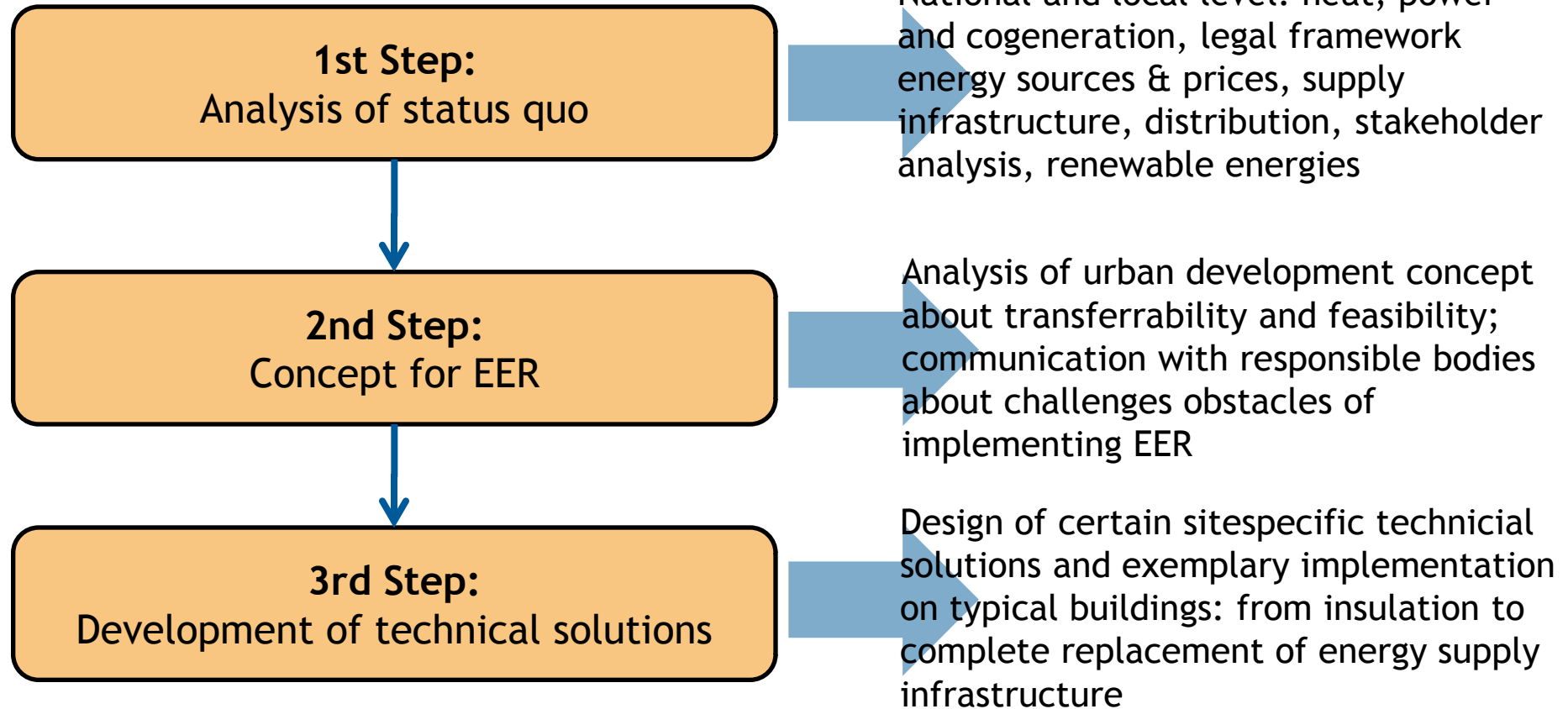


Conception of actual measures

Realisation

Other funds:
e.g. JESSICA

2. Objectives



3. Recommendations

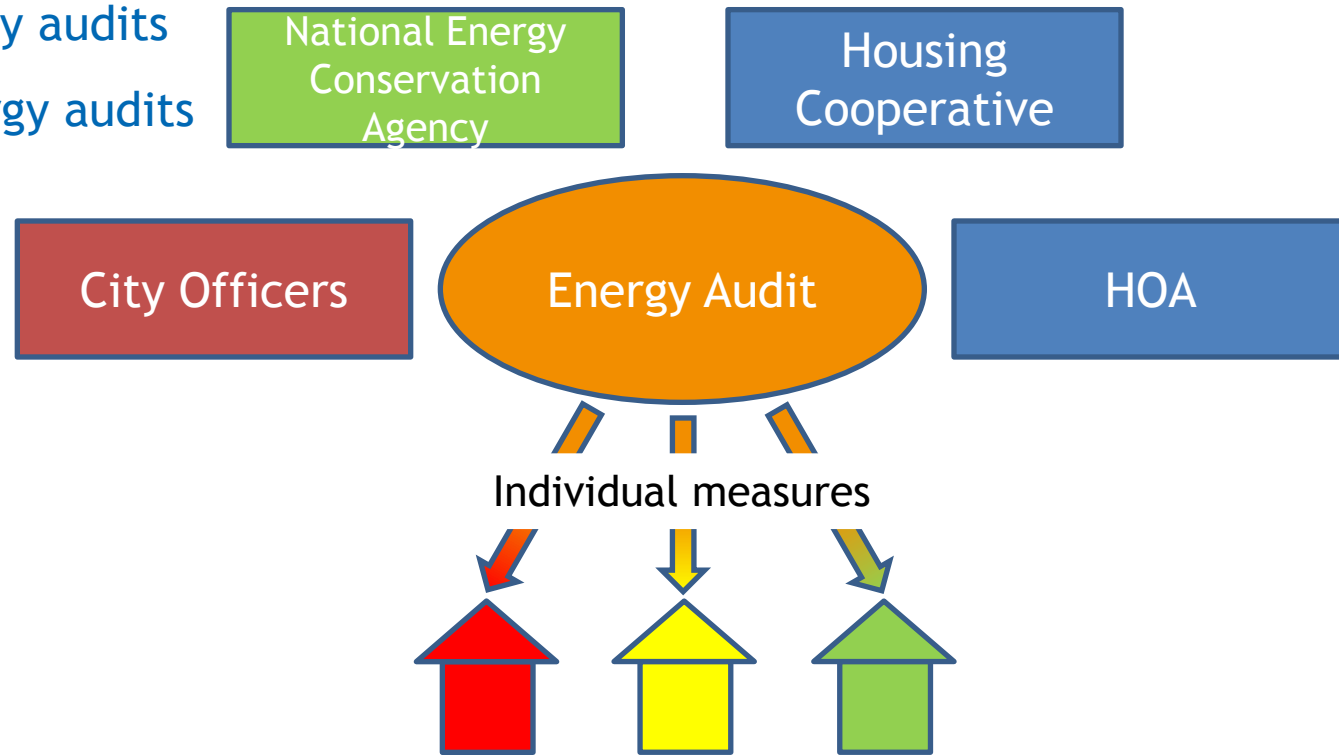
Components of energy and climate concepts

- energy- and CO2 -balance
- evaluation of energy saving potentials
- energy and climate objectives / targets
- Action Plan with prioritized and feasible measures
- Management Plan for controlling the implementation of measures and visualization of success

3. Recommendations from the target areas

Involve local stakeholders and raise their awareness (Piaseczno)

- permission for energy audits
- elaboration of energy audits
- presentation of energy audits



3. Recommendations from the target areas

Analyze the energy supply, -consumption, -efficiency potentials (Rakvere)

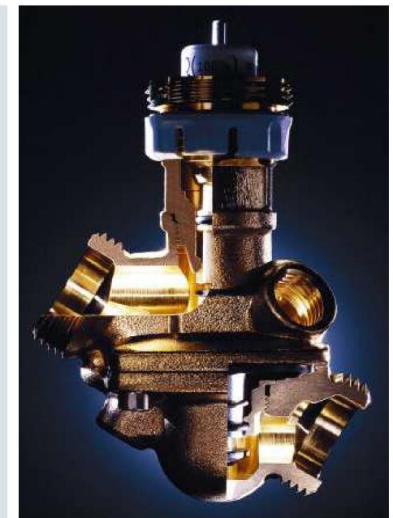
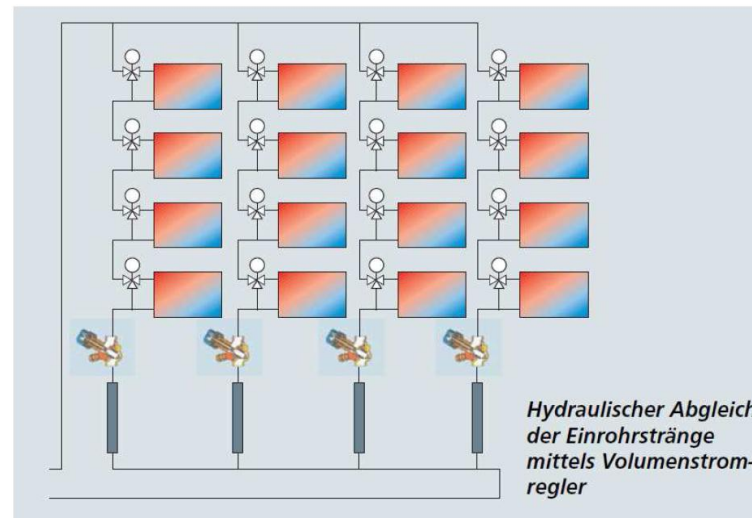
- average heat consumption 180 kWh/m²/a
- aim after renovation is 60 kWh/m²/a
- district heating system
- insulation status quo $U = 1 \text{ W/m}^2\text{K}$
- aim after renovation $U = 0,2 \text{ W/m}^2\text{K}$
- installation of new radiators with thermostatic valves
- replacement of old 1-pipe system by 2-pipe system
- replacement of wooden windows by alu frame (air tight construction →)
- installation of ventilation with heat exchange system necessary
- projected integration of 50% RE through wood fuels



3. Recommendations from the target areas

Implement low-cost measures to reduce energy consumption (Wernigerode)

- analysis heat consumption/connected load (costs: $0,2 \text{ €}_{\text{gross}}/\text{m}^2$)
- adjustment of connected load and heating curve
(costs: $0,49 \text{ €}_{\text{gross}}/\text{m}^2$, reduction: $2,08 \text{ €}_{\text{gross}}/\text{m}^2$)
- hydraulic balancing (costs: $5,34 \text{ €}_{\text{gross}}/\text{m}^2$, reduction: $0,99 \text{ €}_{\text{gross}}/\text{m}^2$)



3. Recommendations

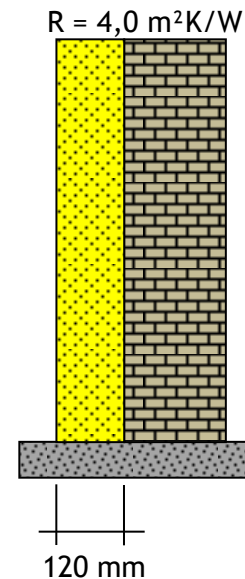
Organizational measures

- appointment of municipal climate energy managers to develop and implement energy concepts, quality management and energy portfolio management
- provide training to structural engineering / building service companies, due to lacking knowledge in the rapidly evolving fields of energy efficient refurbishment and facility management
- differentiated methods for homogenous and heterogenous districts

3. Recommendations

Energy Efficiency measures on building level

- insulation >12 cm
- walls: $R > 4,0 \text{ m}^2\text{K}/\text{W}$
- roofs: $R > 4,5 \text{ m}^2\text{K}/\text{W}$
- doors: $U < 1,3 \text{ W}/\text{m}^2\text{K}$
- windows: $U < 2,0 \text{ W}/\text{m}^2\text{K}$
- installation of thermostatic valves
- central domestic hot water production
- calculation of sustainable thermo modernization investment



Source: Wikipedia

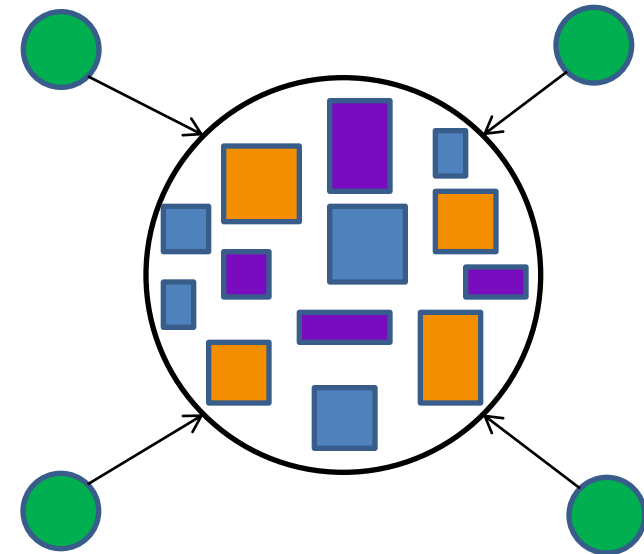
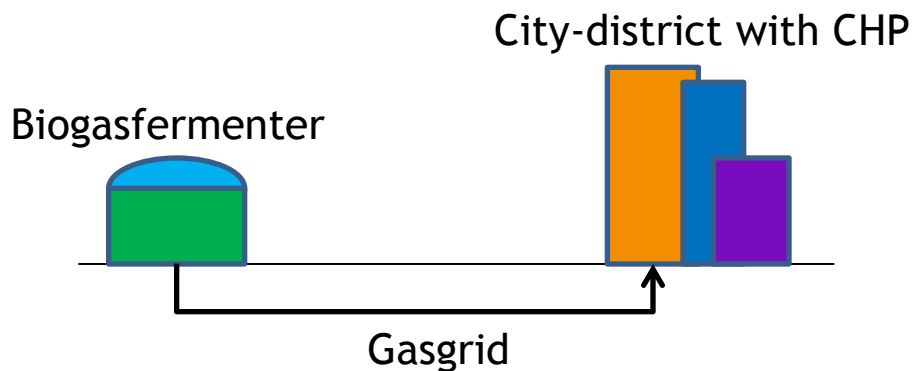


Source: Rehau

4. Projected Integration of Renewable Energies

Biogas for Potsdam: idea

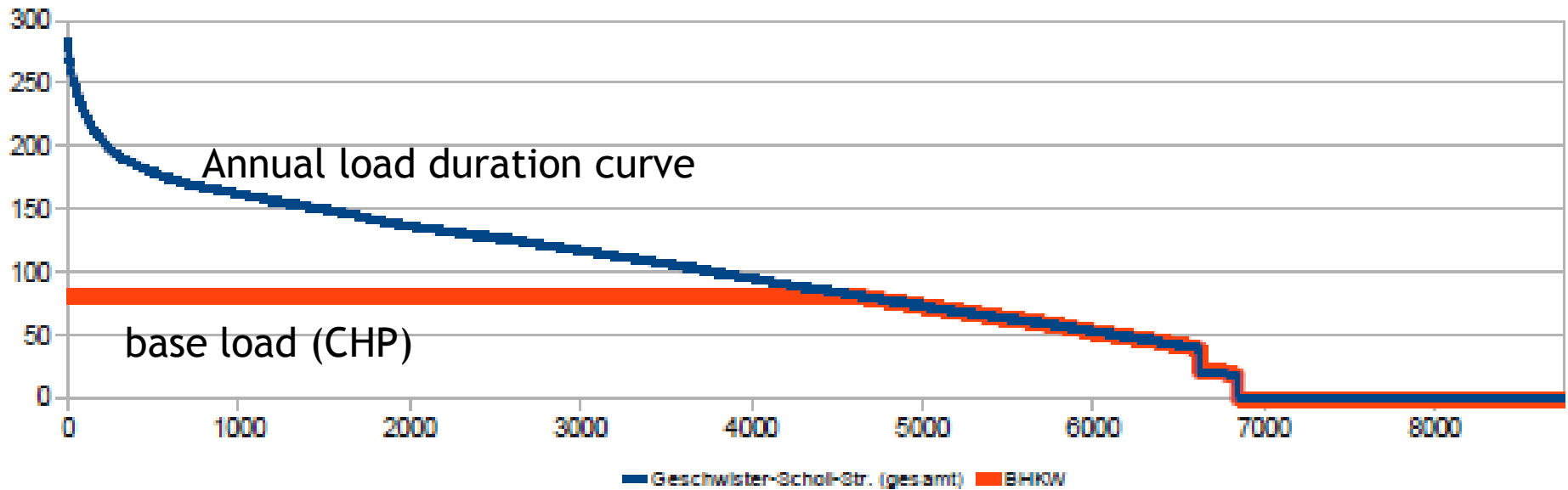
- peripheral production of biogas fed into the gas grid
- decentralized use in site specific cogeneration plant
- BfP: conception of CHP basing on energy audit in certain houses



4. Projected Integration of Renewable Energies

Biogas for Potsdam: study

- B3-audit: heat demand → annual load duration curve
- exemplary buldings (20 kW - 300 kW and above) + school
- integration of thermally controlled CHP



4. Projected Integration of Renewable Energies

Biogas for Potsdam: results

- competitive heat production from 26 kW_{th}, 5000 h/a (full load)
- up to 17% cost advantage (0,135 €/kWh - 0,091 €/kWh)
- CHP integration investment: 76.389,34 € (12,5 kW_{th}) - 134.388,93 € (88 kW_{th})
- identification of possible CHP-sites in Potsdam in two scenarios:
 - full CHP integration: 27 sites - 1.764.622 € total investment
 - economical CHP integration (>26 kW_{th}): 12 sites - 1.217.325 €
- calculation of agricultural land needed for biogas production:
 - full: 273 ha (11.087 t/a liquid manure, maize- grassilage, rye meal)
 - economical: 218 ha (10.078 t/a s.a.)
- CO₂-reduction up to 54,2 %

5. Upcoming activities in Brandenburg

- full translation of „Survey and evaluation of most suitable renewable energy resources and technologies for selected areas in Brandenburg“
- December 15th: workshop for renewable energy production in small rural cities
- 2 prefeasibility studies for energy independent peripheral districts in rural cities
- 2012 CCI annual focus „energy and resources for tomorrow“



Thank you for your attention!