Contracting and building renovation - Does it work together?

Wibke Tritthart, IFZ (Inter-university research centre for technology, work and culture) Graz, Austria

Jan W.Bleyl, Graz Energy Agency, Austria

Gerhard Bucar, Graz Energy Agency, Austria

Susanne Bruner-Lienhart, IFZ Graz, Austria

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Background and ideas

- Renovation as a window of opportunity:
  but comprehensive renovation was (2004) still an exception
- EPC-features: guarantee, operation and maintenance, (pre-)financing, service-oriented, risk transfer from owner to ESCo
- → Enhance the scope of EPC to cover construction measures
- Social study + pilot projects

Social study: ESCo (Energy service company)

- 8 Interviews
- Questions asked:
  - Why are so few EPC projects with construction measures?, What is your opinion on such projects?, Under what conditions could the dissemination rise?
- Construction costs outweigh HVAC upgrading costs
- Building renovation is a complex task
- Preferred clients: public authorities, social housing companies
- Advantages for the client:
  - Whole building approach, „1-stop-shop“, high quality , innovative products, ecology

Social study: Building owners / clients

- 5 interviews
- Questions asked:
  - What features are especially valuable for your projects?, What conditions hamper EPC+additional construction? What are prerequisites (legal, tendering, cooperation, etc.)? How could innovative systems be promoted?
- Connection between building renovation and EPC has not been seen: lack of (basic) information, lack of demonstration projects
- Continous maintenance
- Duration of the contract
- Most promising: pooling, innovative products in specific buildings (e.g.schools)

Social study: Builders and general contractors

- 5 interviews
- Questions asked:
  - How does EPC does/would affect your projects? What are barriers?, Under what conditions would your company consider EPC?
- (Informal) business networks (subcontractors)
- Guarantees concerning construction; energy saving guarantee
- Functional descriptions in tenders
- Contract period
- Motivation: be present in all matters of construction

Social study: Engineers and architects

- 3 interviews
- Questions asked:
  - Your opinion on features of EPC (guaranteed savings, etc.), Under what conditions would you recommend EPC in a renovation project?, What differences will occur?, etc.
- Lack of basic information on EPC:
  - How can you judge whether EPC could add additional benefit in a project?, What is the procedure?
- Not an ESCo, rivalry:
  - Energy concept, energy saving estimates, guarantees
- Attractive client: industry

Social study: Finance institutions, banks

- 3 interviews
- Questions asked:
  - What is the importance of EPC as a financing instrument? What features are attractive? What are barriers?
- Detailed and complex tender documents
- In favour of comprehensive renovations
- Advantages: prefinancing and transferring of risks
- Attractive clients: public buildings; commercial buildings, hospitals, etc.
- Mixed financing schemes

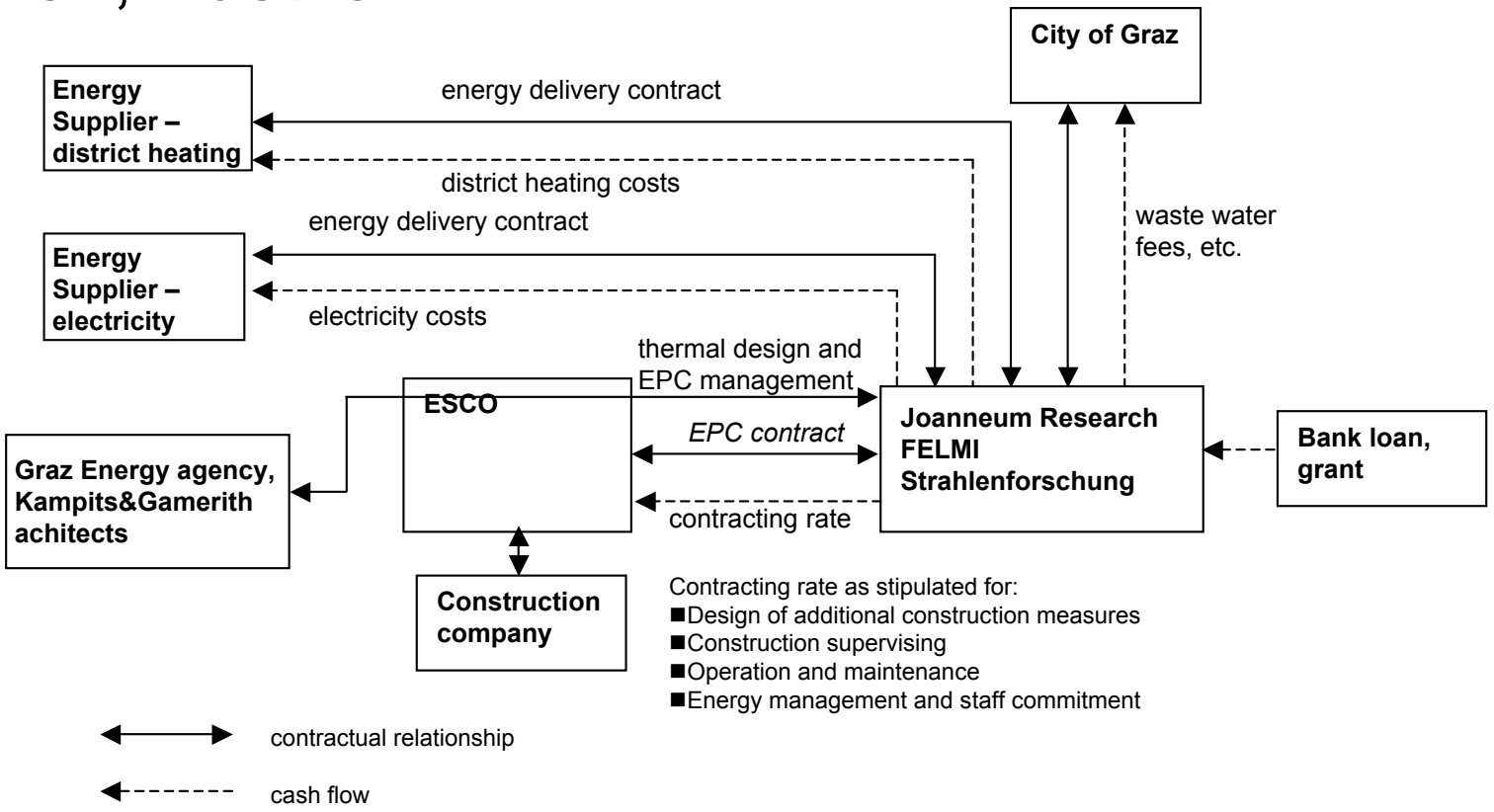
Social study: Summary

- ESCo: *"Might be too expensive."*
  - *Tender documents have to aid companies (m^2, No. of windows, ecology goals, etc.)*
  - *Construction costs: comparable, stable,...*
  - *Two different strategies: either promote comprehensive renovation or concentrate on systems upgrading*
- Building owners, clients: *"Have not thought on this yet."*
  - *Importance is low*
  - *Different starting point (renovation or upgrading)*
- Engineers and architects: *"No experiences."*
  - *Are often the first consultant and could suggest EPC in renovation projects*
- Builders and general contractors: *"Contract terms are too long."*
  - *Should not act as an ESCo*
- Finance institutions, banks: *"Very promising."*

Pilot project 1: Joanneum research building Graz, Austria

- Construction 1962, total floor space 6,543 m²
- Investment costs: 1.3 Mio € for refurbishment and 200,000 € for technical equipment
  - Building envelope measures: insulation of outer walls, replacement of windows
  - HVAC measures: improvement of boiler settings and controls, installation of thermostat valves in the heating water circulation, cooling of the laboratory appliances (electron microscopes, vacuum pumps) by a closed-cycle chiller and a heat exchanger for the room heating, building energy management system
  - Organisational measures: concept for getting the staff involved

Pilot project 1: Joanneum research building Graz, Austria

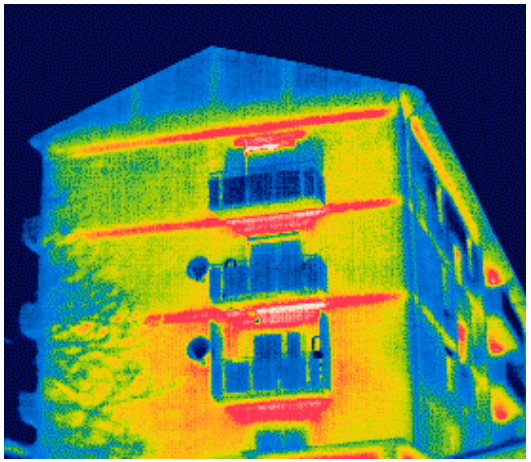


- Baseline: 123,300 € per year (42,700 € heating, 56,000 € electricity, 24,600 € fresh and waste water)
- Savings: 35,900 €/a or 29 % (guaranteed), 7,400 m^3/a of fresh water

Pilot project 2: Multi-storey residential building Vienna, Austria

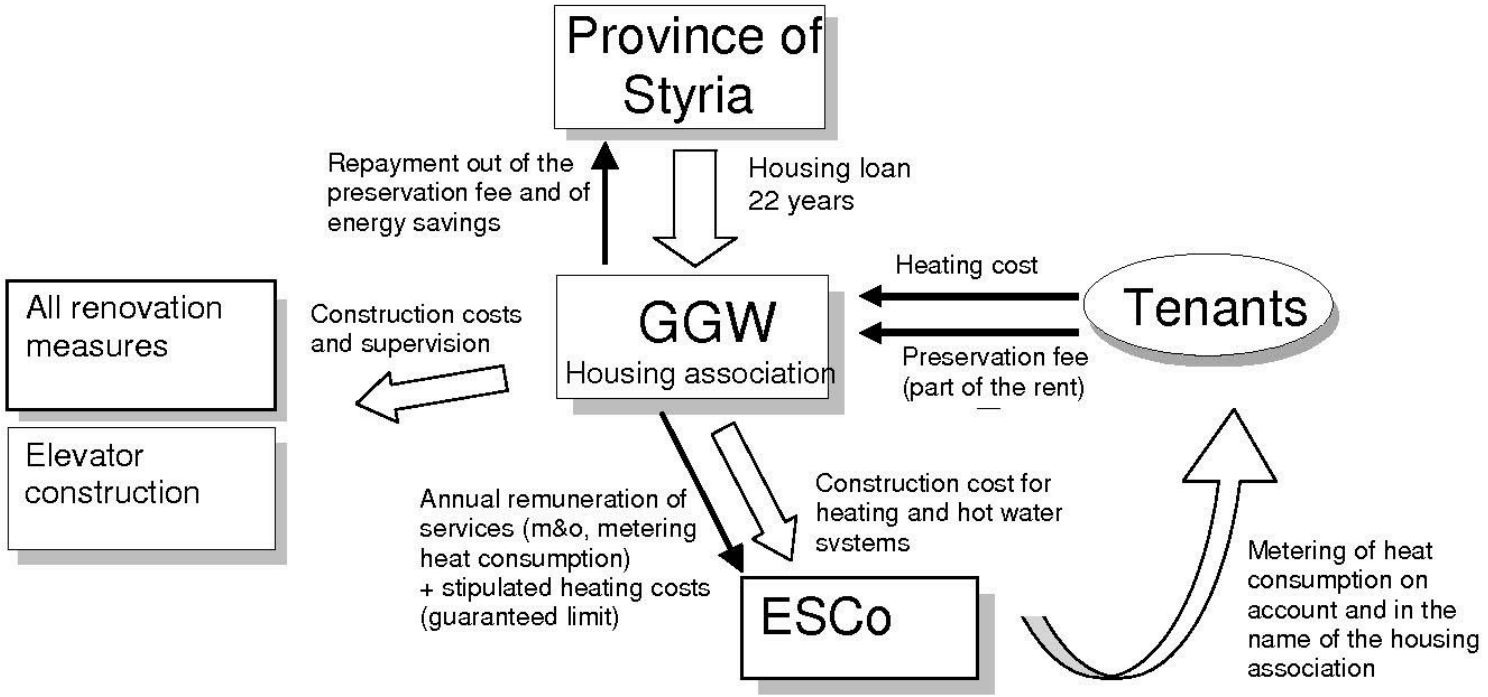
- Construction 1968 – 70, total floor space 10,537 m², two five-storey buildings with a total of 145 dwellings
- 1,123 Mio € (partly financed by a subsidy of 35 € /m²)
  - Insulation of building envelope
  - District heating (reduction of the temperature level and reduction of the mass flow rate, correct calibration of the network pumps), installation of thermostat-valves
  - Tenant information and commitment
- Savings: 60 % of the heat costs (94 kWh/(m²a) heating demand → 39 kWh/(m² a) after renovation)

Pilot project 3: Three residential buildings Graz, Austria


- Construction 1959, total floor space 7,485 m^2, 150 dwellings
- 2,18 Mio € (financed by a very cheap governmental loan and by the savings)
  - Building envelope measures: insulation of external walls, replacement of windows
  - HVAC: installation of a new gas fired central heating and hot-water supply system (including the distribution system) combined with solar collectors (app. 83m^2), etc.
  - Organisational measures: inhabitants with the largest energy consumption are invited to an energy saving information event

Pilot project 3: Three residential buildings Graz, Austria



- Savings: 45 % of the heating costs (120 kWh/(m²a) for heating → 53 kWh/(m²a) for heating after renovation)

Evaluation of the pilot projects

- ESCo: Technical building services and automation/ Consortium of construction company and plumbing trade company/ regional gas provider
- Contract period: 15 years/ 10 years/ 15 years
- Saving guarantee
- Risk transfer: operation of lab equipment, Construction supervision, solar collector
- Integrated building optimisation
- Financing
- Role of Energy Agency: tender documents, comunication with inhabitants

Conclusions and further recommendations

- Social study: barriers were mentioned concerning the guarantees/risks for company, the pay-back time, provision of tendering documents

  Positive response was on integrated design, ecology criteria, extended guarantees for client
- Pilot projects: guarantees (residential!), pre-financing, role of ESCo, role of Energy Agency
- Further efforts on: Improve the concept, activities to facilitate promotion, private building owners, qualification programme for construction trade (guarantees), EPC-know-how transfer to architects and engineers

References/acknowledgement

- Project within the Austrian Programme „Building of Tomorrow“ (www.hausderzukunft.at): „Contracting als Instrument für das Althaus der Zukunft“ („Contracting as an instrument for the renovation of tomorrow´s old buildings“), managed by Graz Energy Agency.

- EUROCONTRACT project (EIE): „Comprehensive refurbishment of buildings with energy services“, see presentation of Jan Bleyl (paper 5,039)