

Best Practices: Implementing energy services in federal building – German experiences

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- 2,000 military properties + 2,500 civil properties
- Energy Costs (2005)
 - Military properties: 280 Mio. €/yr
 - Civil properties: 300 Mio. €/yr
- Energy Consumption
 - Heat: 7.4 Mio. MWh/yr
 - Electricity: 2.4 Mio. MWh/yr
- Specific Energy Consumption
 - Military properties: Heat: 118 kWh/m²*yr
Electricity: 32 kWh/m²*yr
 - Civil properties: Heat: 88 kWh/m²*yr
Electricity: 45 kWh/m²*yr

- Federal pilot project, starting in 2002
- Realization is assigned to dena (German Energy Agency)
- Main project focuses were on:
 - Development and provision of guidelines and tender instruments (>3,300 prints, >1,400 CD-ROM, >50,000 downloads in 2-3 years)
 - Systematical recordings of the state properties' data
 - Selection of suitable properties
 - Initiation of contracting tenders and projects
 - Technical backing of the call for tenders / during project realization
 - Evaluation and documentation of the project's results + PR
- An evaluation of the pilot project was made by Bremer Energy Institute (BEI) in 2007

- **Energy Supply Contracting (ESC)**

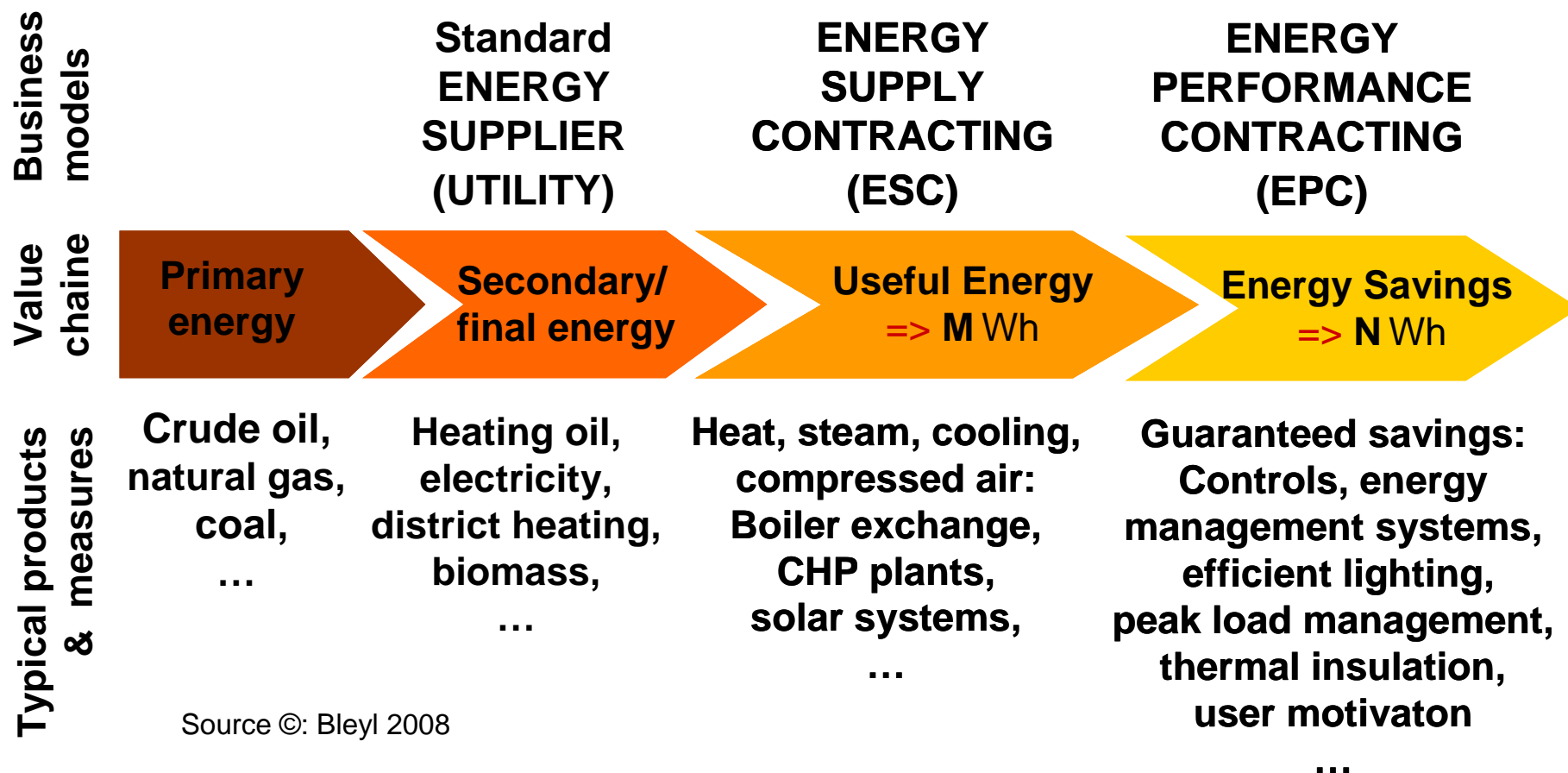
- The contractor plans, finances and installs technical equipment (heat boiler, CHP...) on his own risk
- He provides the facility owner with the useful energy (heat, electricity...) in the appropriate quality and quantity
- The contractor refinances his investigations through the payment fixed in the energy supply contract

- **Energy Performance Contracting (EPC)**

The Contractor commits himself to:

- Identify and develop energy saving potentials in all sectors of the energy demand of the facility owner
- Amortize his investment by the energy cost savings
- Guarantee energy savings during the project contract period

Variants of Contracting



Source ©: Bleyl 2008

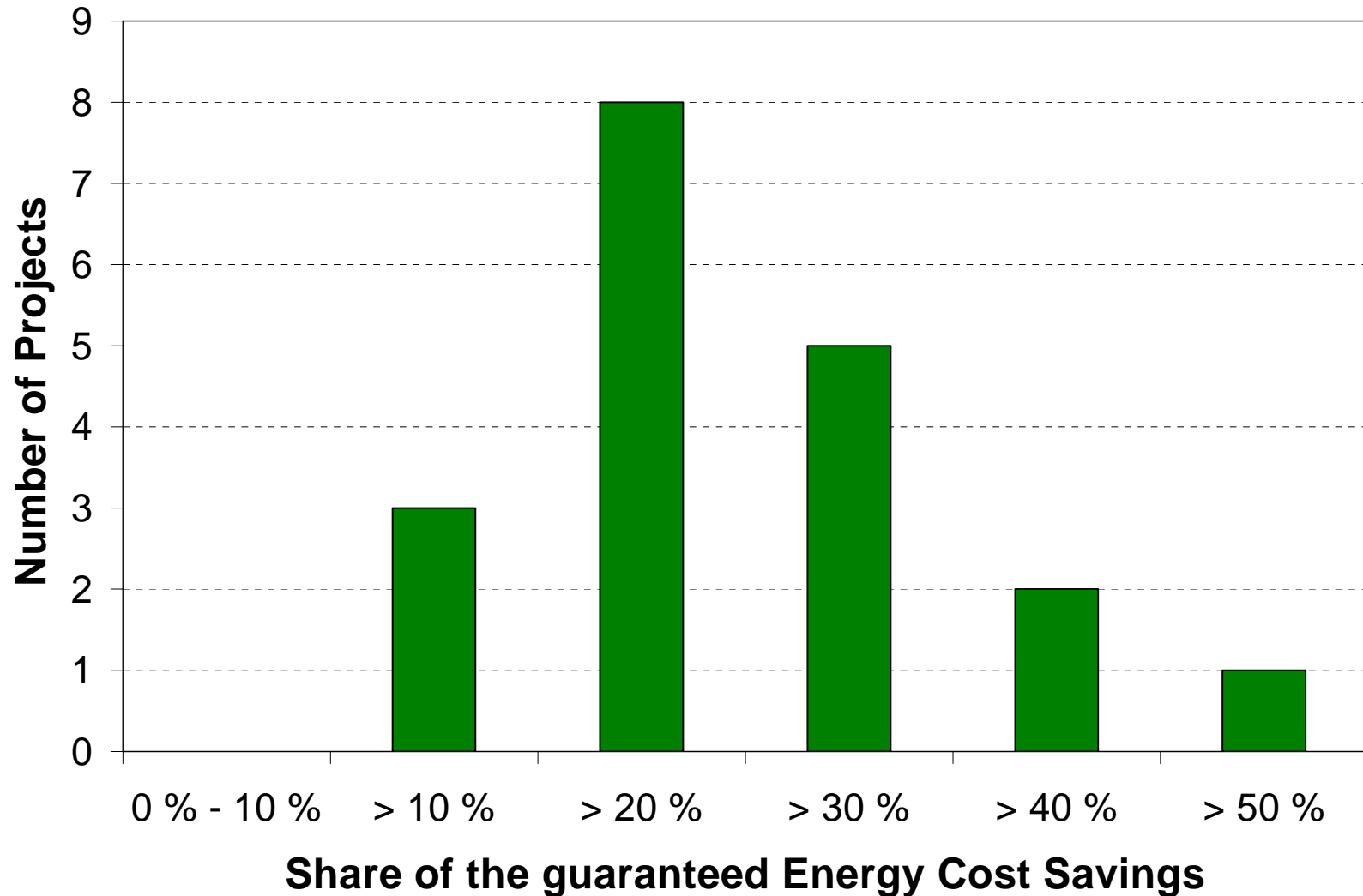
- Properties involved in dena projects (31 Dec 2006):
 - Energy Supply Contracting (ESC): 4
 - Energy Performance Contracting (EPC): 26

- Evaluation of 19 EPC-Projects
 - Data basis: 26 March 2007
 - Input data (mean values) for calculations:
 - Technical life time: 15 years
 - Interest on capital: 4 %/yr
 - Increase of energy costs: 2.5 %/yr
 - Maintenance & Repair: 3 %_{Invest} /yr
 - Realised share of energy savings in case of internal procurement: 85 %

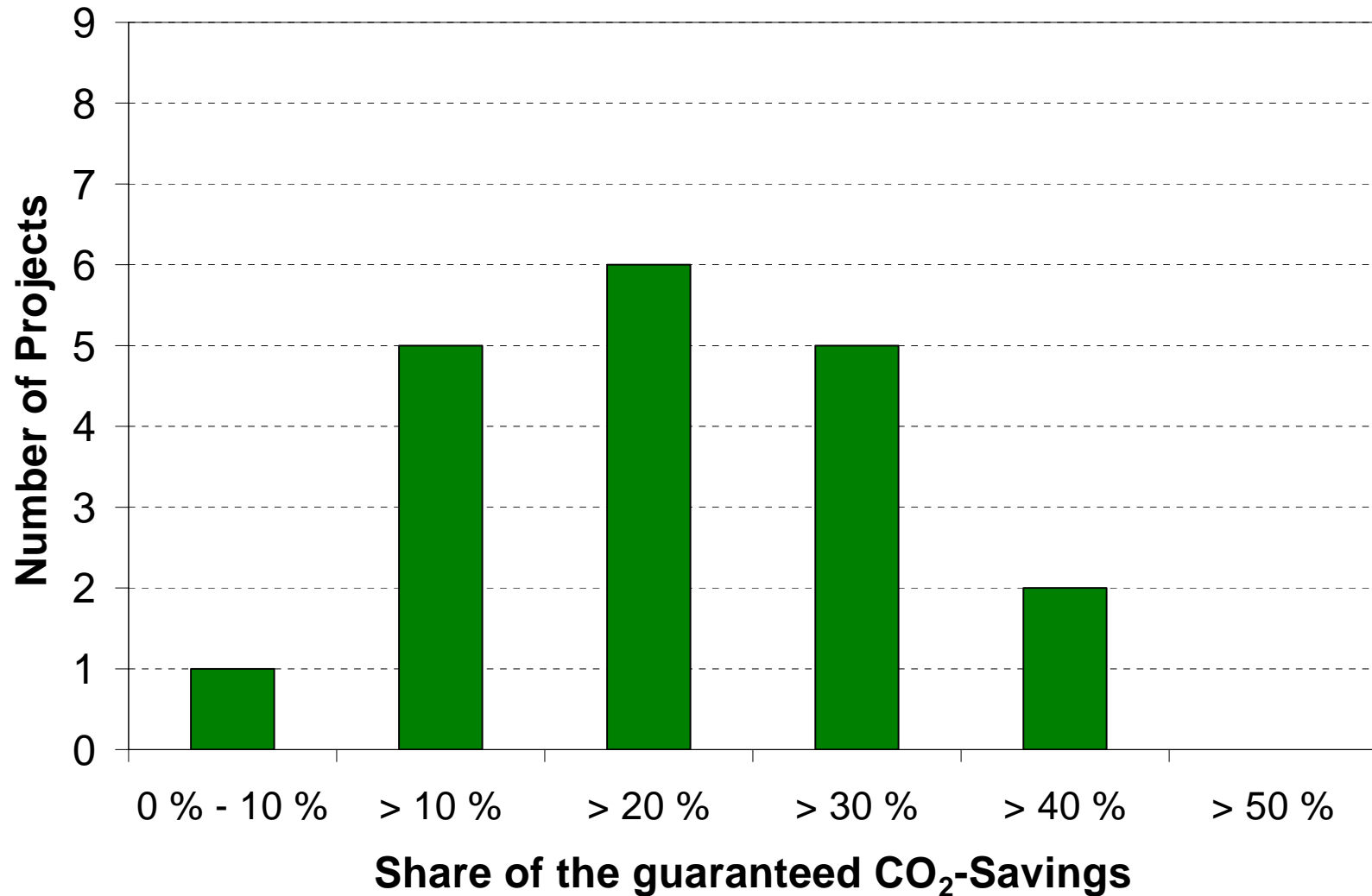
EPC: Project database

No.	Number of properties	Gross area [m ²]	Energy Costs (Baseline) [€/yr]	CO ₂ -Emissions [t/yr]	Guaranteed Investment [€]	Guaranteed Energy Cost Savings [€/yr]	Immediate property cost savings [€/yr]	Contract period [yrs]
1	1	52,085	260,000	2,380	272,000	77,000	15,000	10.0
2	1	80,000	409,000	3,160	336,000	128,000	36,000	7.0
3	1	27,276	235,000	1,124	174,000	35,000		10.0
4	1	70,879	449,000	3,597	662,000	120,000	19,000	10.0
5	1	29,504	338,000	1,769	320,000	77,000	2,000	10.0
6	2	186,337	1,011,000	4,906	1,092,000	149,000		13.5
7	1	20,354	548,000	2,857	720,000	228,000	77,000	10.0
8	3	95,508	692,000	3,622	1,282,000	256,000	64,000	10.0
9	6	118,000	2,467,000	15,282	4,470,000	751,000	120,000	10.0
10	1	20,000	204,000	1,515	478,000	47,000		10.0
11	1	63,319	705,000	4,072	434,000	129,000	40,000	10.0
12	2	80,000	435,000	2,849	559,000	186,000	55,000	10.0
13	1	10,389	147,000	1,066	130,000	37,000		10.0
14	1	34,856	353,000	1,143	626,000	85,000	9,000	13.0
15	1	15,145	73,000	559	92,000	16,000	2,000	13.0
16	1	76,067	558,000	4,107	1,503,000	347,000	28,000	12.0
17	1	22,589	217,000	979	215,000	53,000	3,000	10.0
18	1	52,572	601,000	2,880	738,000	230,000	97,000	10.0
19	1	13,793	95,000	583	82,000	31,000	11,000	10.0
Sum	28	1,068,673	9,797,000	58,451	14,185,000	2,982,000	578,000	
Average		56,246	515,632	3,076	746,579	156,947	38,533	10.5

Renewals of / Improvements to / Use of	Projects	Share [%]
Heating, pumps, distribution system, hydraulic leveling...	19	100
Ventilation, HVAC system	13	68
Central building control systems	13	68
Energy management, -monitoring, -controlling	13	68
Lightning	11	58
CHP, wood boiler	10	53
Reduction of water consumption	5	26

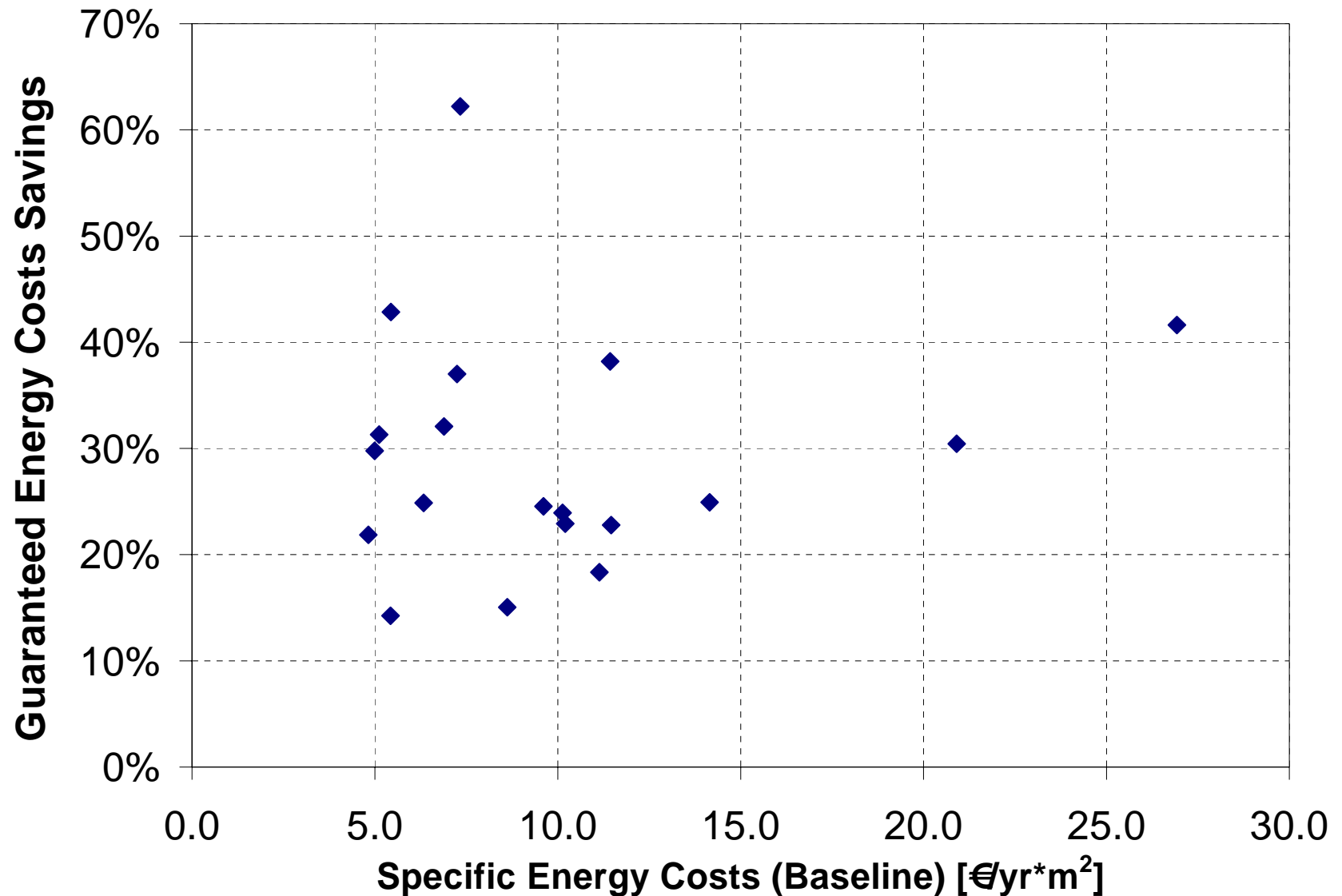


- **Min: 14.3 %, Average: 29.4 %, Max: 62.2 %**

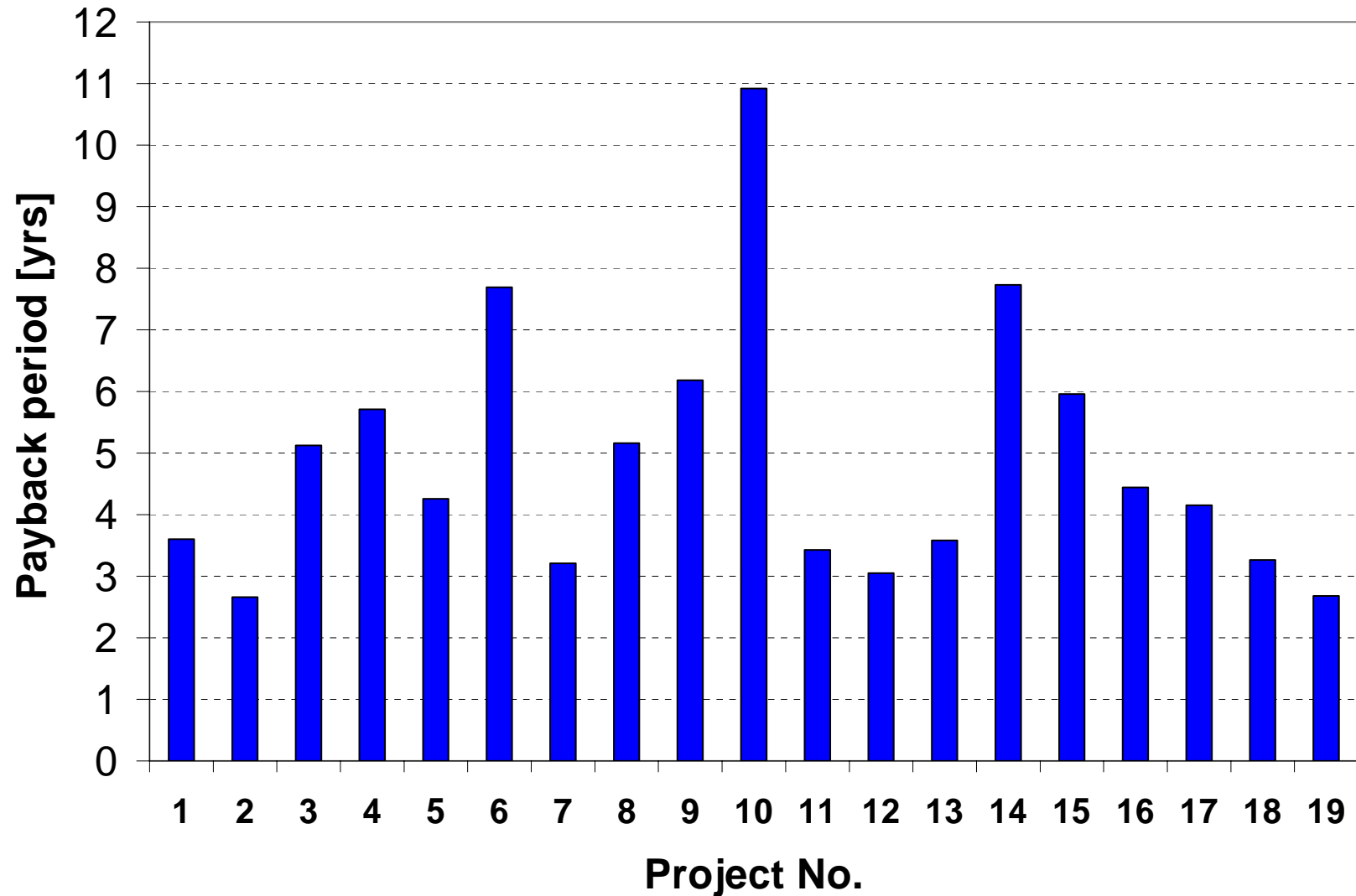


- **Min: 7.3 %, Average: 27.7 %, Max: 49.0 %**

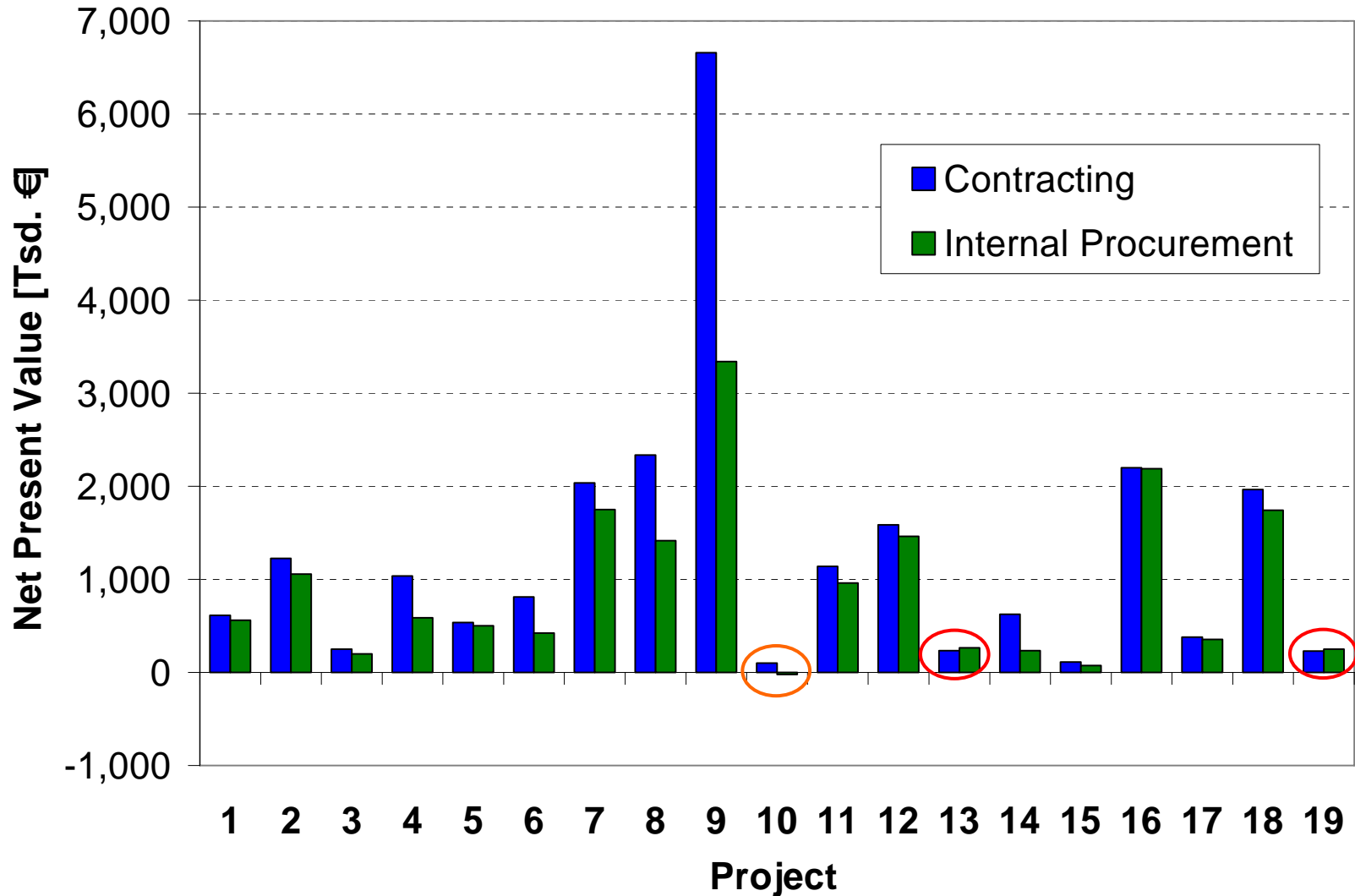
Relation between specific energy costs and guaranteed energy cost savings



Payback period



- Min: 2.7 yrs, Average: 4.9 yrs, Max: 10.9 yrs



- Contracting performs better by 38 % on average

- Questions about

- satisfaction with the tender,
- results,
- administrative expenses,
- collaboration with the contractor...

Answers possible
from 1 = very positive
to 6 = very negative

→ Satisfying results:

Building authorities: 2.2 - 2.8, property users 1.9 - 2.7
but...

“Would the contracting projects have been achieved without dena?”

Number of answers “Yes”: 0

→ Up to now contracting projects in state properties do not develop on users own initiative!

- Lack of information about contracting (mentioned 3 times)
- Uncertainties of property usage in the future (3 x)
- Fear of loosing responsibility / job (2 x)
- Negative experiences (2 x)
- Fear of high personnel costs for project implementation (2 x)
- Long-term contract periods (1 x)
- Property is too small for a contracting project (1 x)

- Better data collection of the status quo / the potential for modernization of the properties (e.g. annual energy reports)
- Implementation of multiplier structures / national or regional tender and expertise centers
- Responsible departments should assume a voluntary self-commitment to save energy / to realize projects
- Budget responsibility of the property users for the energy costs to achieve an economic incentive

- 1st phase of Energy Efficient Govt. Buildings Programme:
9 public buildings
 - Energy savings: 20 - 46 % (average 30.6 %)
 - Payback period of 1.0 - 4.2 yrs (average 2.4 yrs)

- No problems with technique nor with know how

Source: IEA-DSM, Task XVI: “Competitive Energy Services”, Stakeholder Workshop March 31st, 2008, New Dehli (et al.)

- Lack of information and awareness about Energy Service Companies (ESCOs)
- Lack of success stories / best practice examples, no proven track records: → neutrality / credibility of ESCOs?
- Lack of support from the Government
- Financiers are used to taking commercial risks, not a technical risk
- Facility managers do not want to take ESCOs their own responsibilities
- EPC: establishing the baseline
- ...

- Strengthen demand side!
 - Provide informations and promote contracting:
 - manuals / guidelines
 - success stories → pilot projects are essential; ESC instead of EPC!?
 - workshops / trainings
 - guided tours / inspections
 - Improve neutrality:
 - provide peer-reviewed contracts / standard documents
 - independent rating of ESCOs
 - independent consultants
 - multiply BEE (Bureau of Energy Efficiency) activities
 - Active support for project development:
 - Initiation of contracting tenders and projects
 - Technical backing of the call for tenders / during project realization
 - Improve financing:
 - financing of energy audits
 - innovative financial instruments (e.g. partial risk guarantee fund)

Thank you for your attention!

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