



Internal Contracting: the example of Stuttgart

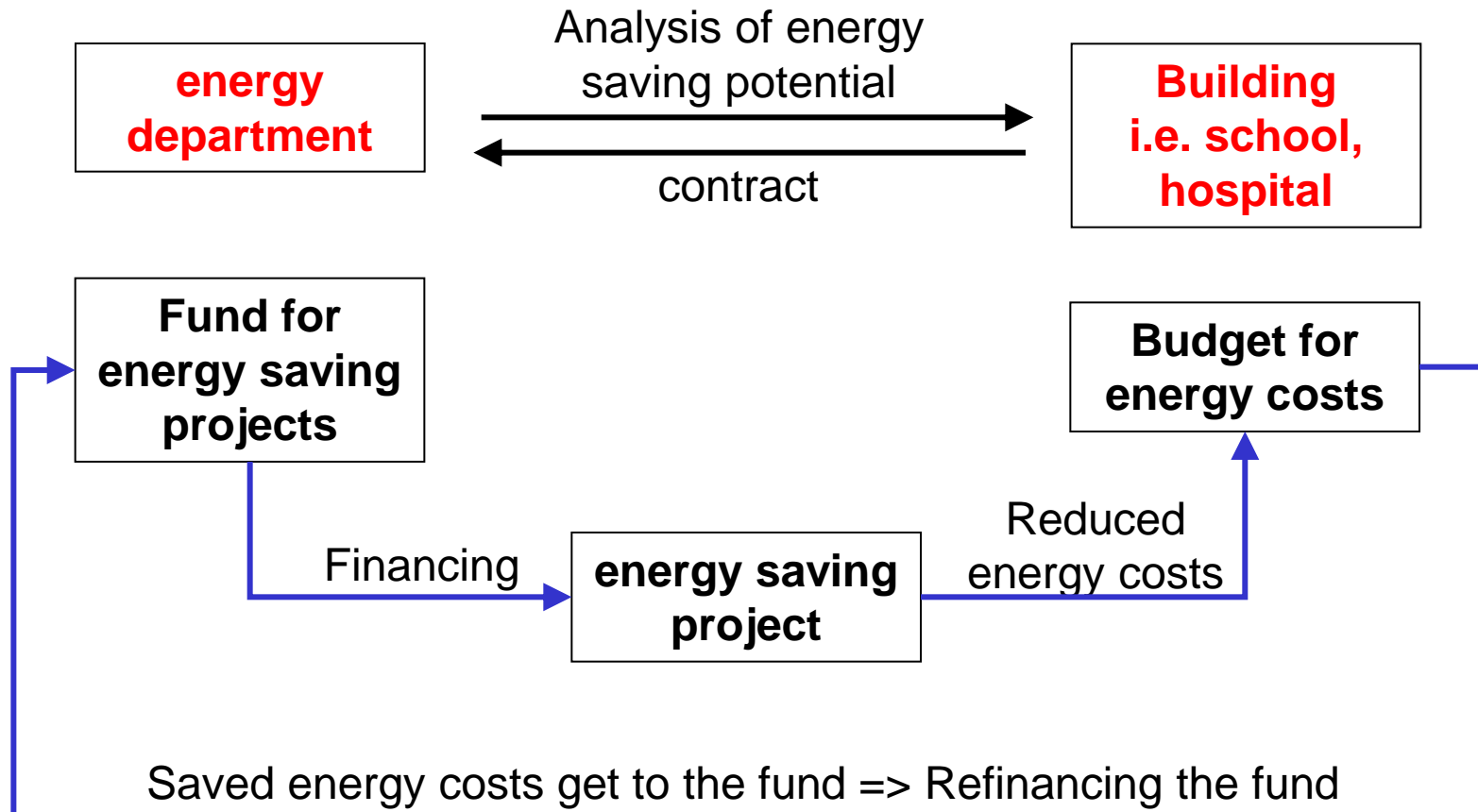
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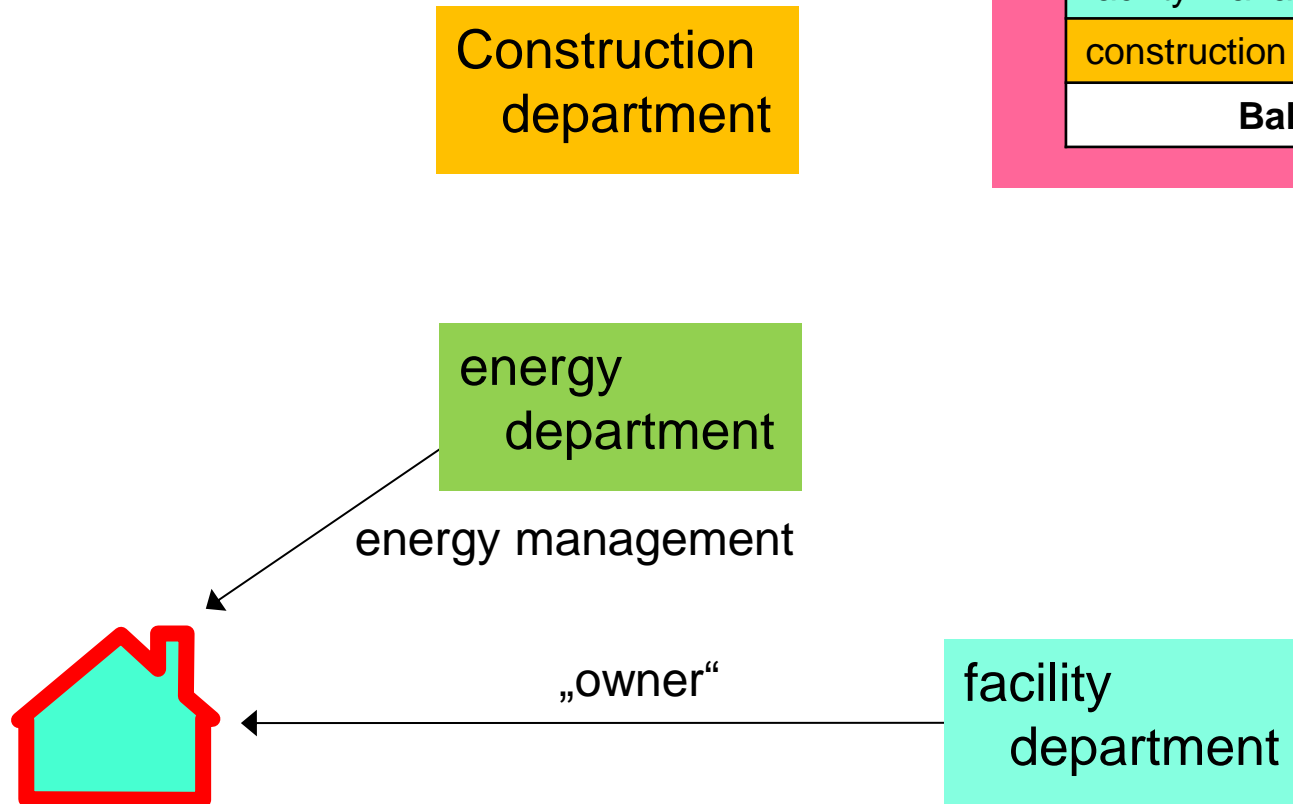


Principle of internal contracting





Work scheme – step 1

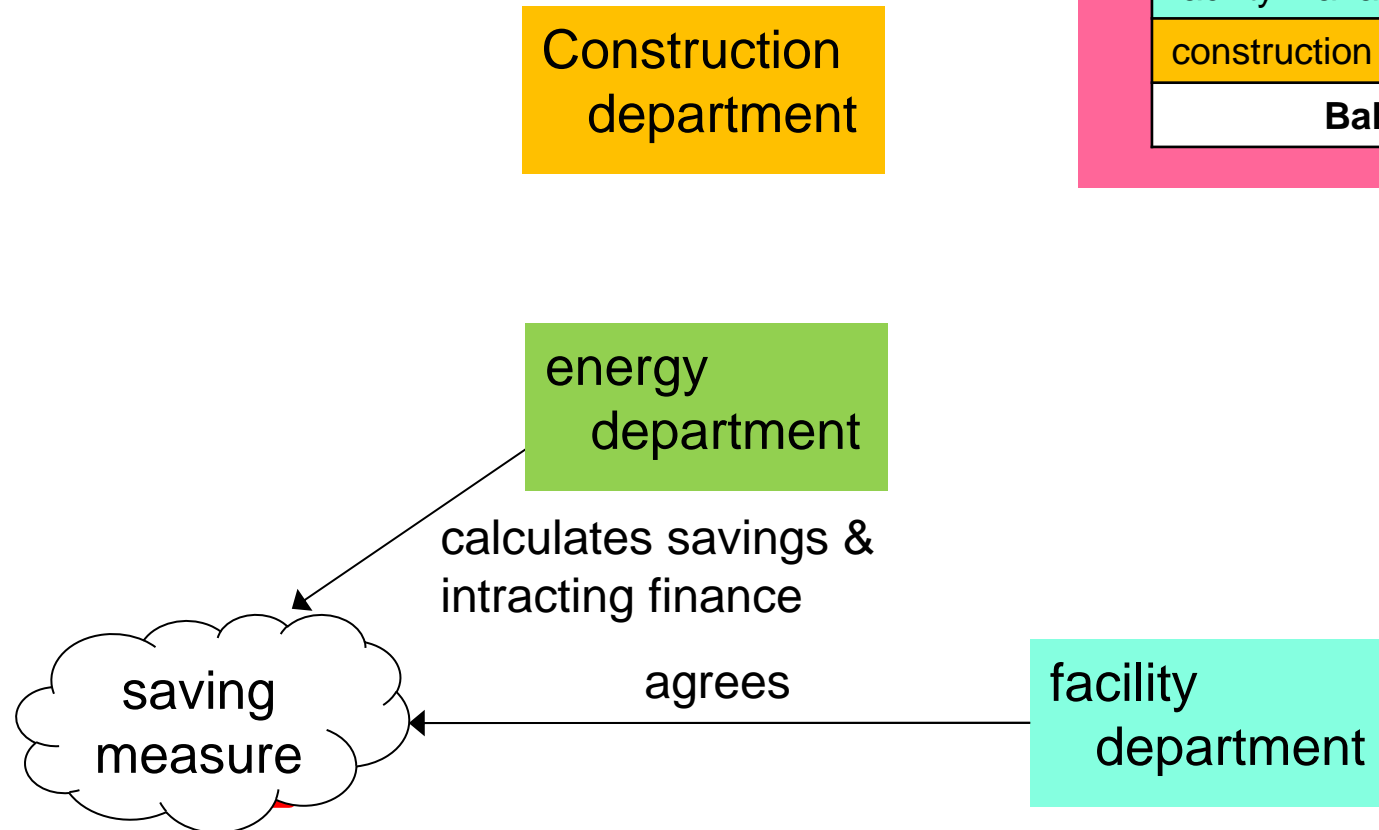


finance department

departments	city budget
energy	
facility managing	
construction	
Balance	0 €



Work scheme – step 2



finance department

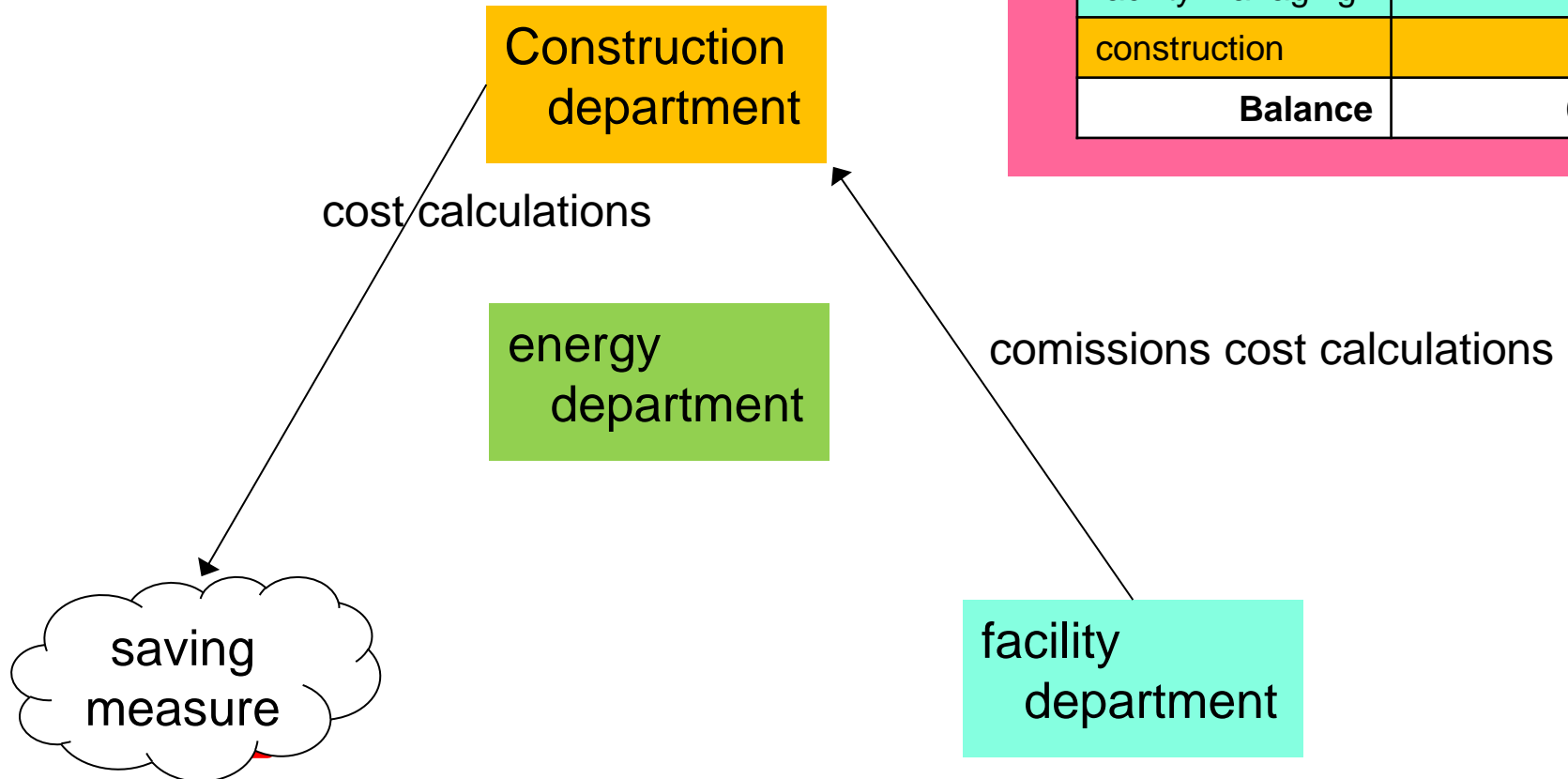
departments	city budget
energy	
facility managing	
construction	
Balance	0 €



Work scheme – step 3

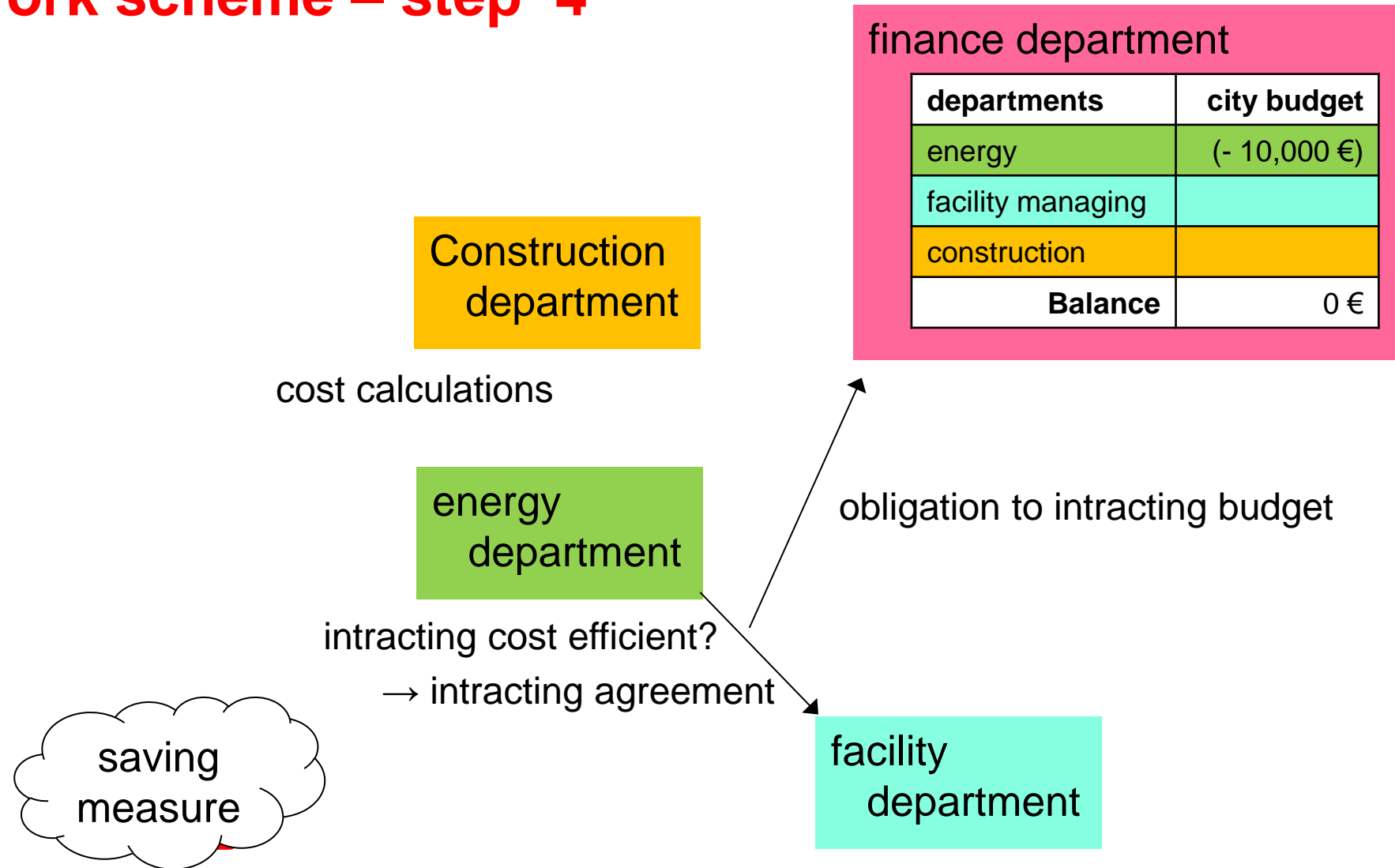
finance department

departments	city budget
energy	
facility managing	
construction	
Balance	0 €



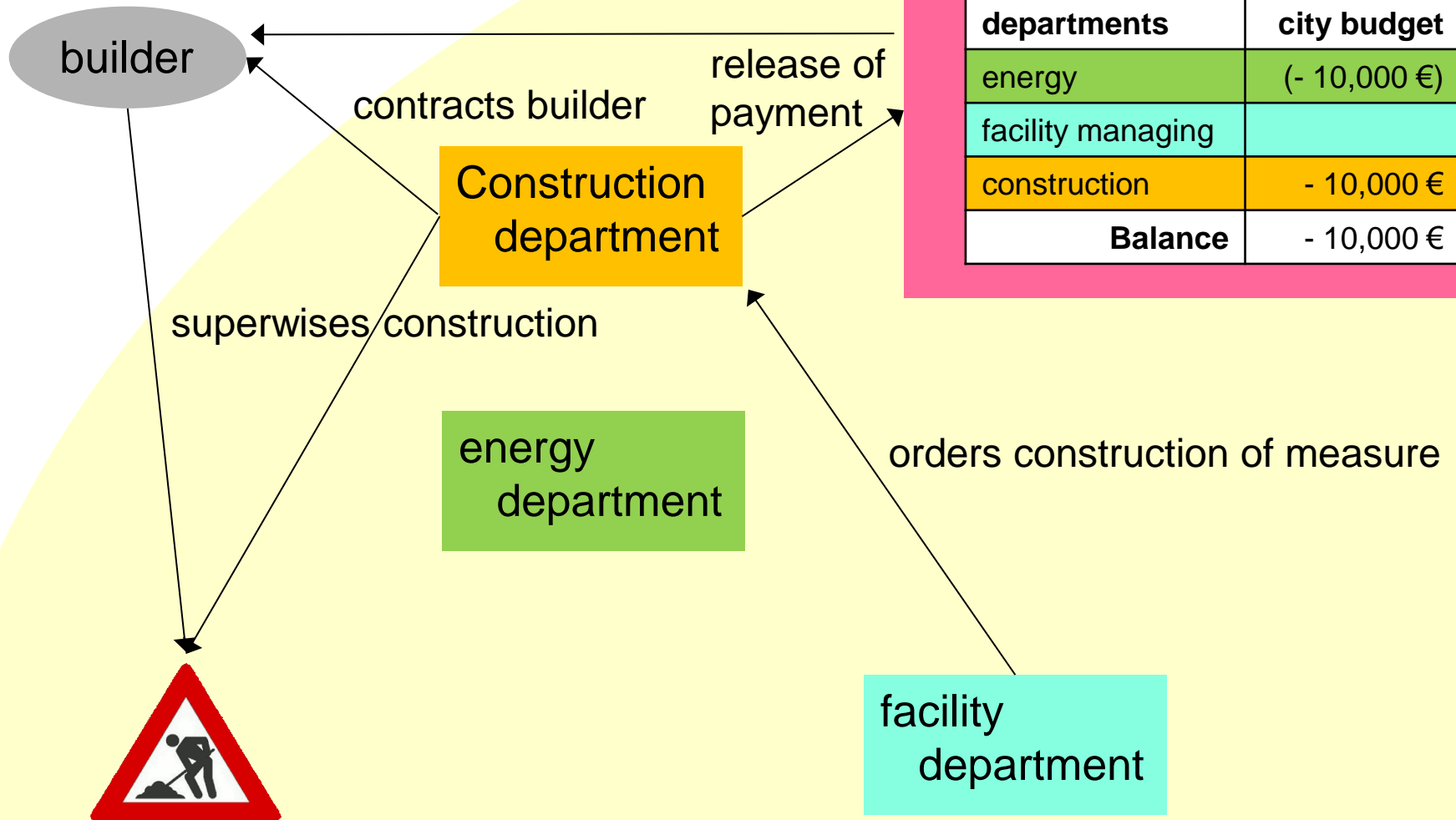


Work scheme – step 4





Work scheme – step 5



finance department

departments	city budget
energy	(- 10,000 €)
facility managing	
construction	- 10,000 €
Balance	- 10,000 €



Work scheme – step 6



Construction department

energy department

facility department

finance department

departments	city budget
energy	↑ - 10,000 €
facility managing	●
construction	●
Balance	- 10,000 €

annual settlement

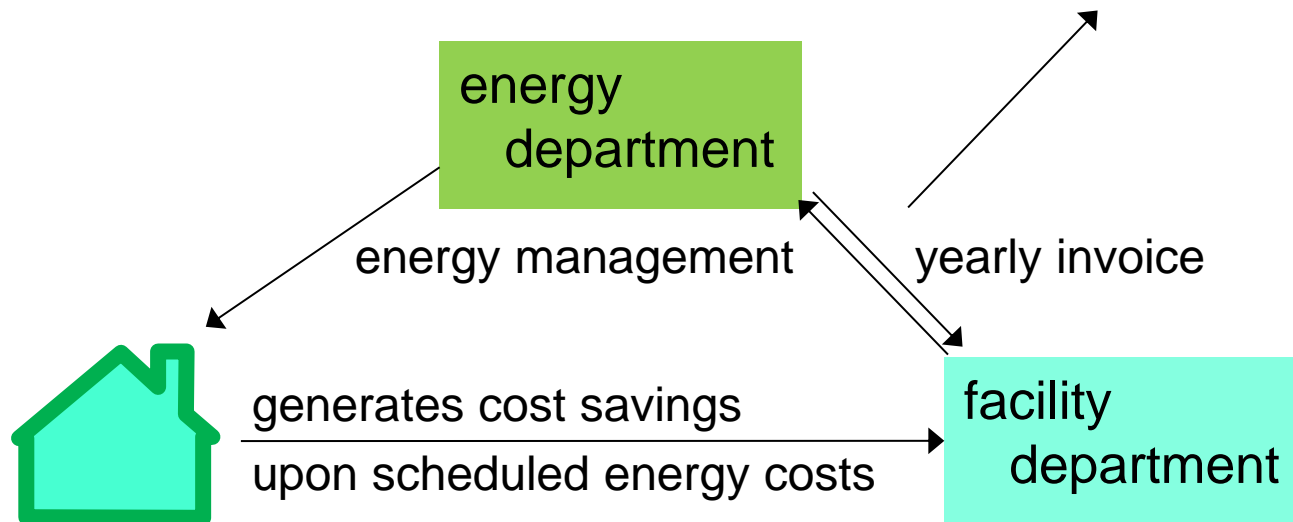


Work scheme – step 7-11

finance department

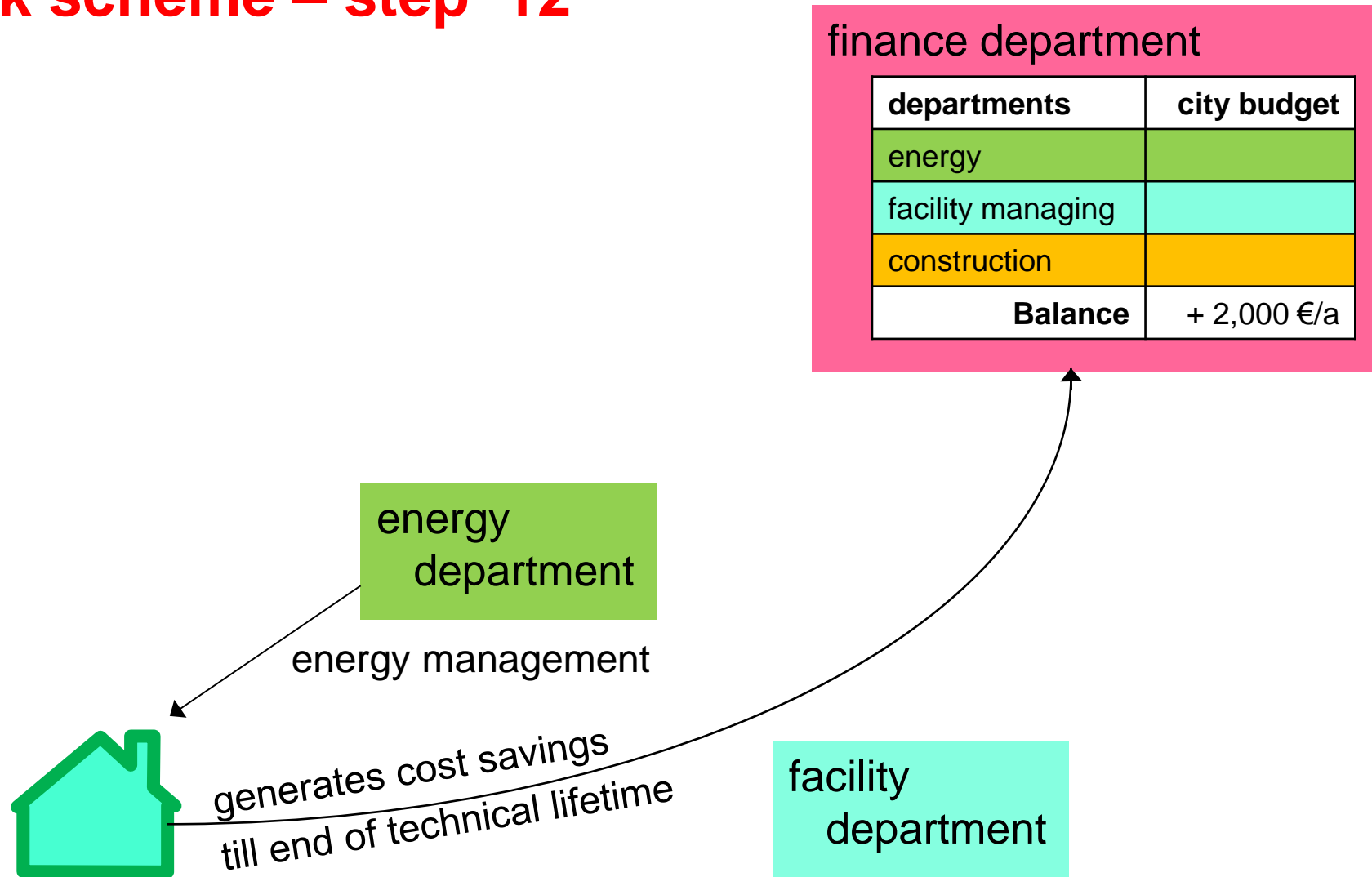
departments	city budget
energy	↑ - 8,000 €
facility managing	● + 2,000 €/a
construction	
Balance	- 8,000 €

annual settlement





Work scheme – step 12

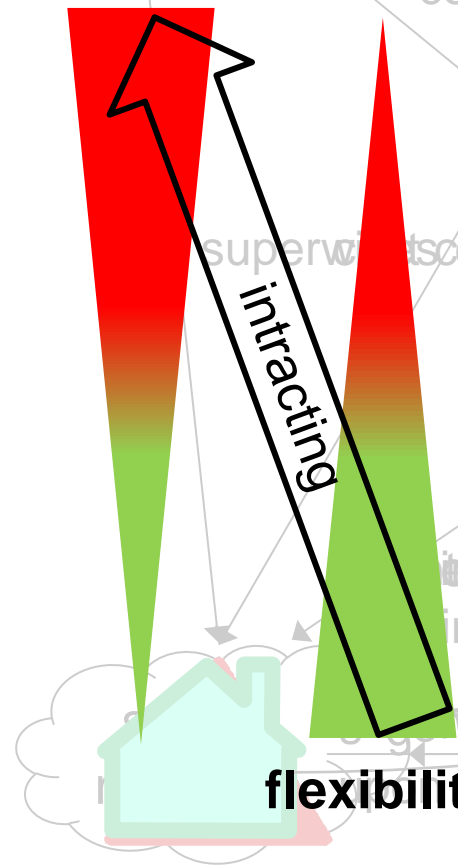




Why this complexity?

administration size

rules procedures



intracontracting is another procedure, but aiming to enable flexible actions

finance department

departments	city budget
energy	(- 10.000 €)
facility managing	- 10.000 €
Balance	+ 2.000 €/a

annual settlement

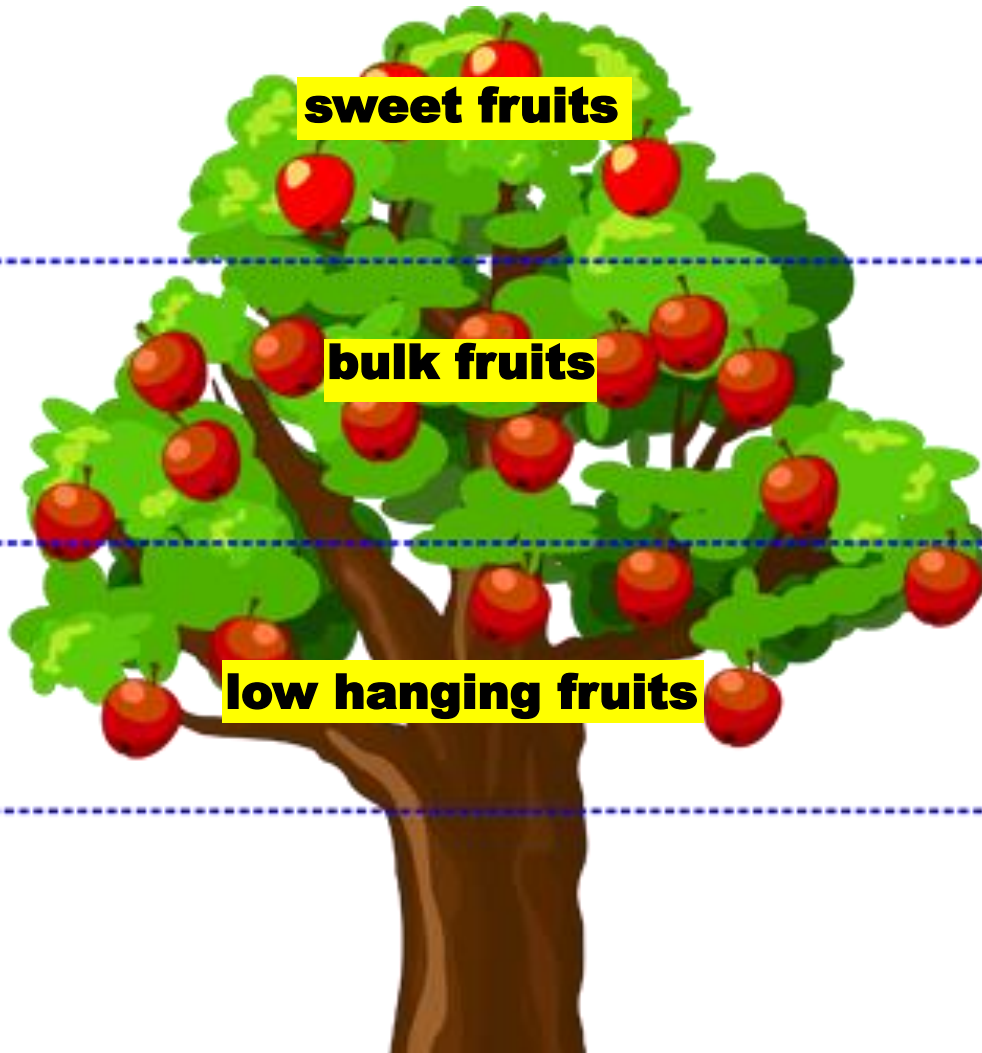
obligation to provide energy

facility department



Harvesting energy savings

characteristic of saving measures:



- great sustainability (savings over technical lifetime)
 - high invest
-
- high quantity of measures with similar financial parameters
 - equal accounting routines
-
- easy to start with
 - low invest
 - short payback time



Measures financed by internal contracting

Examples:

- installation of thermostats
- new controls for heating, ventilation or lighting
- renewal of lighting
- insulation of walls or top floors
- investment in water saving (e.g. public fountains, reservoirs for gardens)
- heat recovery systems (e.g. in ventilations)
- street lighting (e.g. LED-lamps)
- combined heat and power plants
- renewable energy (e.g. wood chip firing, photovoltaic plants)



Thermal insulation of top floors



- Perfect for tiled roofs with big surfaces
- technically simple
- building physics: ok
- cheap

➔ do it yourself possible

➔ payback time: 4.4 years

Replacing heating valves with thermostats



- **Invest: little**
- **payback time: ~ 5 years**



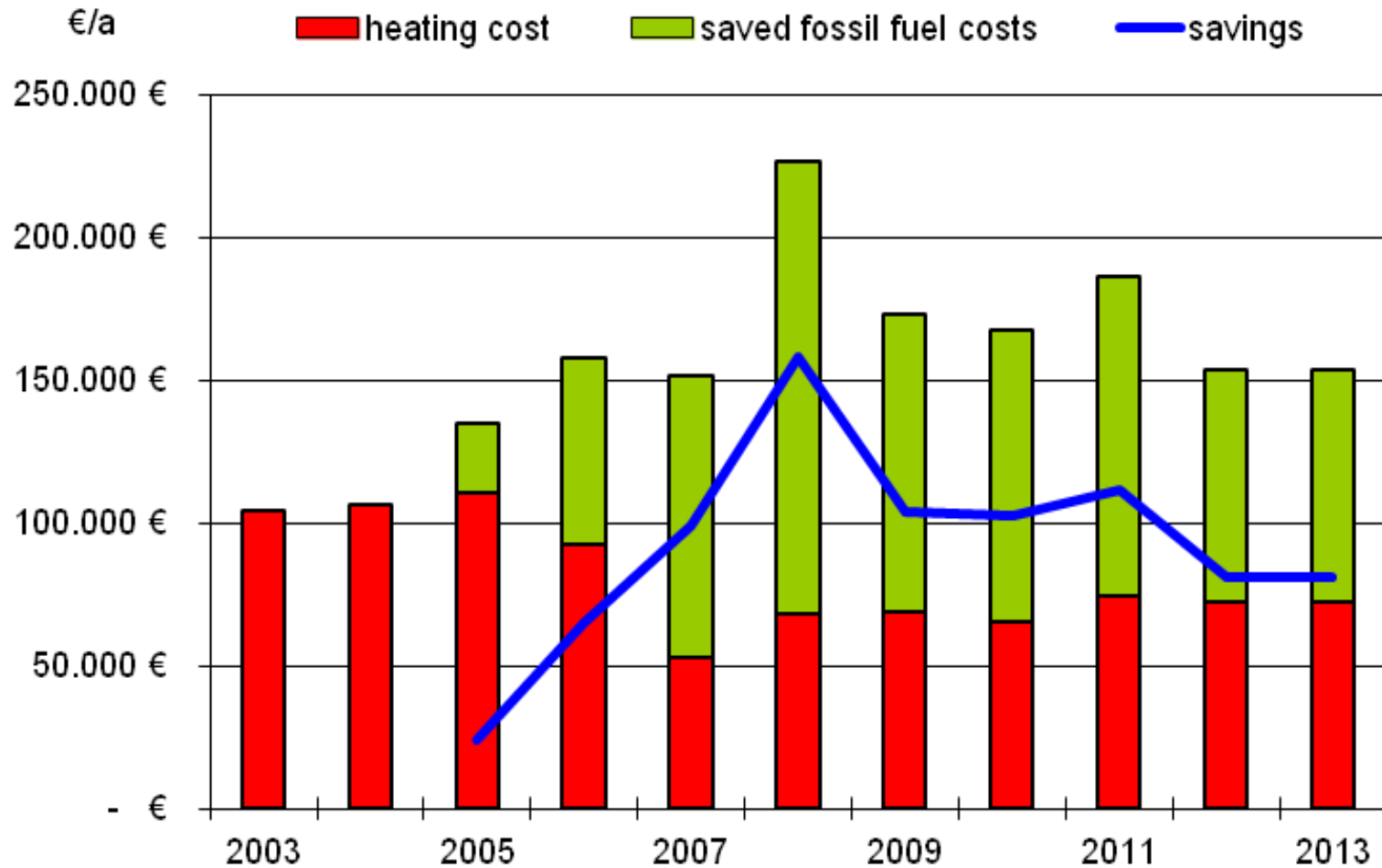
Wood chips for heating – integral concept

- using municipal material
→ reduced cost for disposal
- central wood chips firing
heats school, public pool and fire station:
800 kW, 3.000 MWh/a,
investment: 656.000 €,
savings: 85.000 €/a,
payback time: 7.7 years
- **climate star 2004**
- now: 4 firings in operation





Wood chips for heating – savings





Combined heat and power plants



- 35 - 52 kW electrical power
- 70 - 101 kW thermal power
- 91 - 99 % efficiency
- 254,000 kWh electricity/a
- 495,000 kWh heat/a
- 108,000 kg CO₂ - savings/a
- 16,000 € cost savings/a
- 90,000 € investment
- 6 years payback

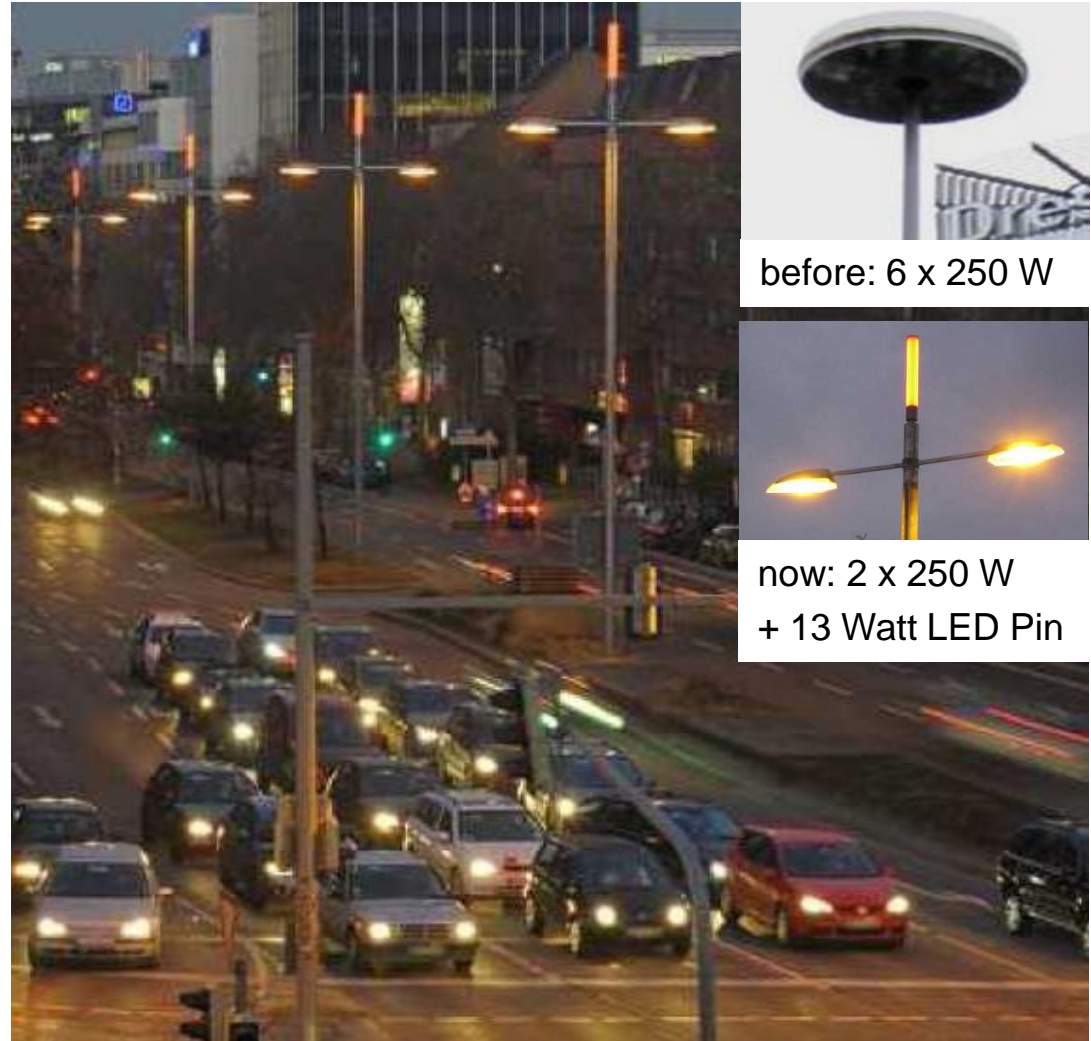
Photovoltaic plants



- area: 105 m²,
rating: 12.6 kW_p
- Savings: 12,600 kWh/a,
8.7 t CO₂/a,
6,500 €/a
- investment: 94,900 €
- payback time: 14.5 a

Street lights

- retrofit of 32 light posts
- investment: 169.700 €
- intracting share:
119.978 € (70,7%)
- savings: 23.751 €/a
- payback time: 5 years



Illumination

incandescent bulb



halogen bulb



fluorescent bulb



LED-bulb



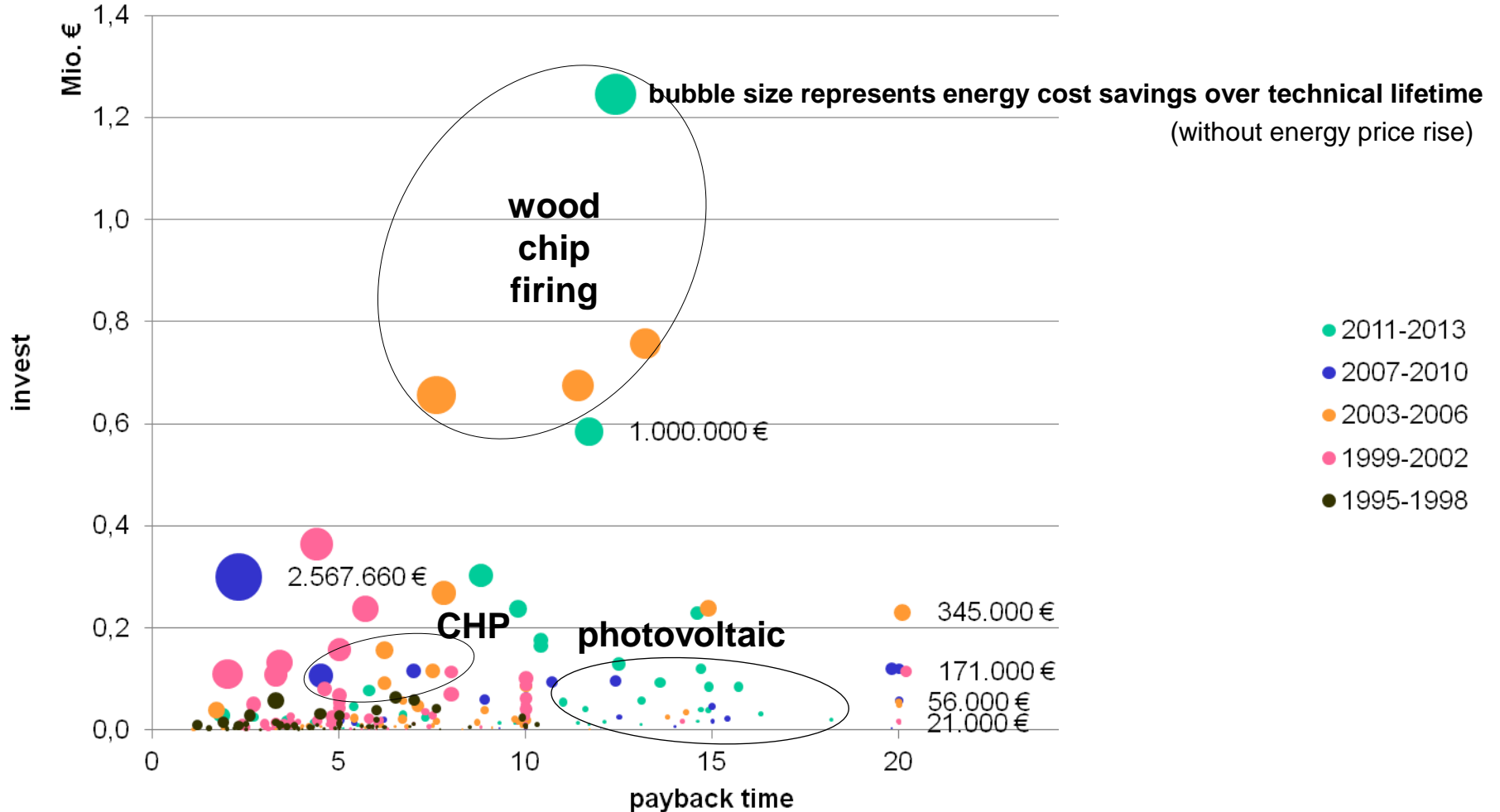
power	60 Watt	52 Watt	15 Watt	10 Watt
light flux	710 lm	840 lm	850 lm	810 lm
efficiency	11,8 lm/W	16,2 lm/W	56,7 lm/W	81 lm/W
technical lifetime	1.000 h	2.000 h	15.000 h	20.000 h
price per unit	0,8 €	2,4 €	10 €	20 €

costs over 20 years (use: 1.000 h/a, energy price: 28 Cent/kWh)

number	10 units	5 units	1,33 units	1 units
investment	16,00 €	24,00 €	13,33 €	20,00 €
energy cost	336,00 €	291,20 €	84,00 €	56,00 €
total costs	352,00 €	315,20 €	97,33 €	76,00 €



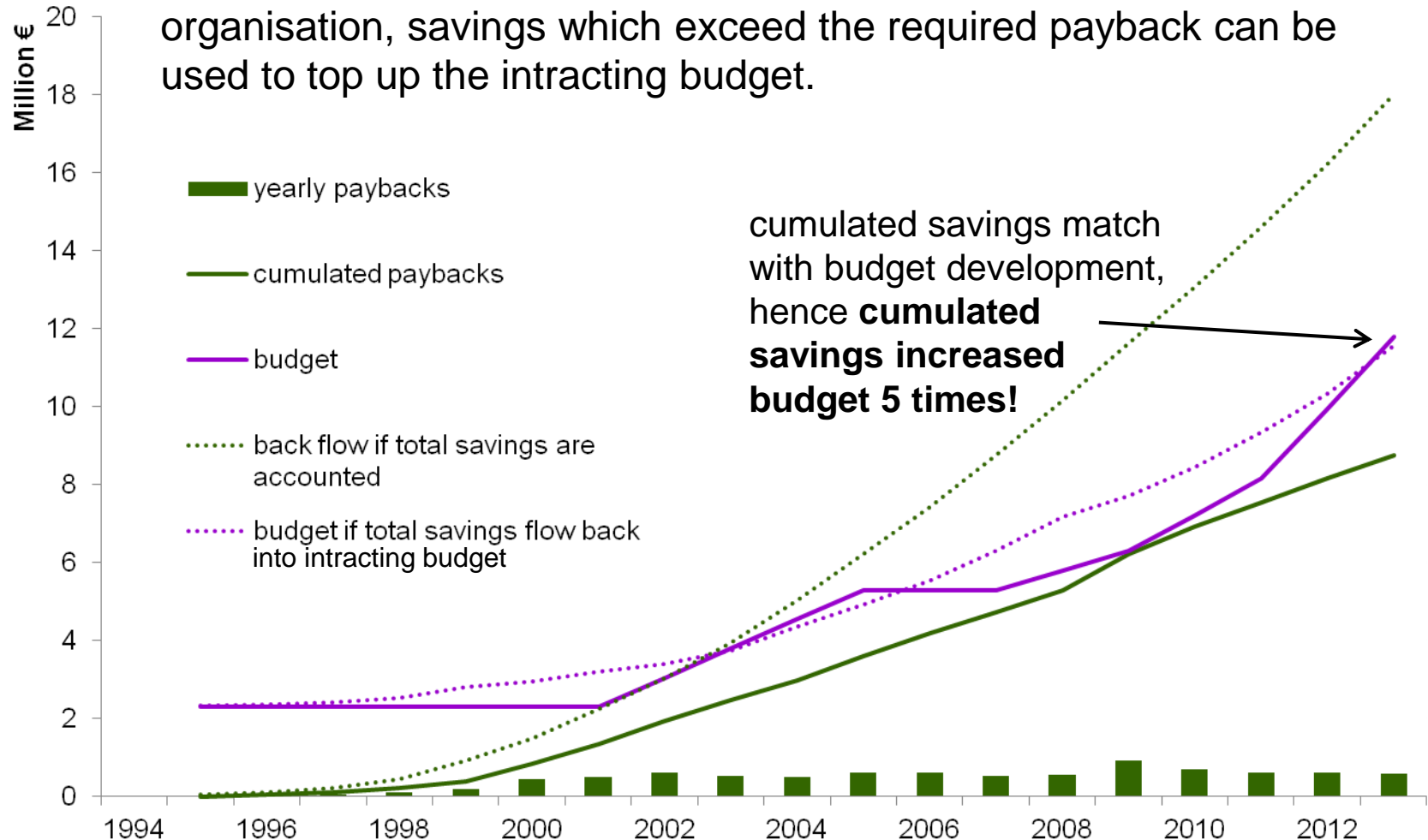
Implemented measures

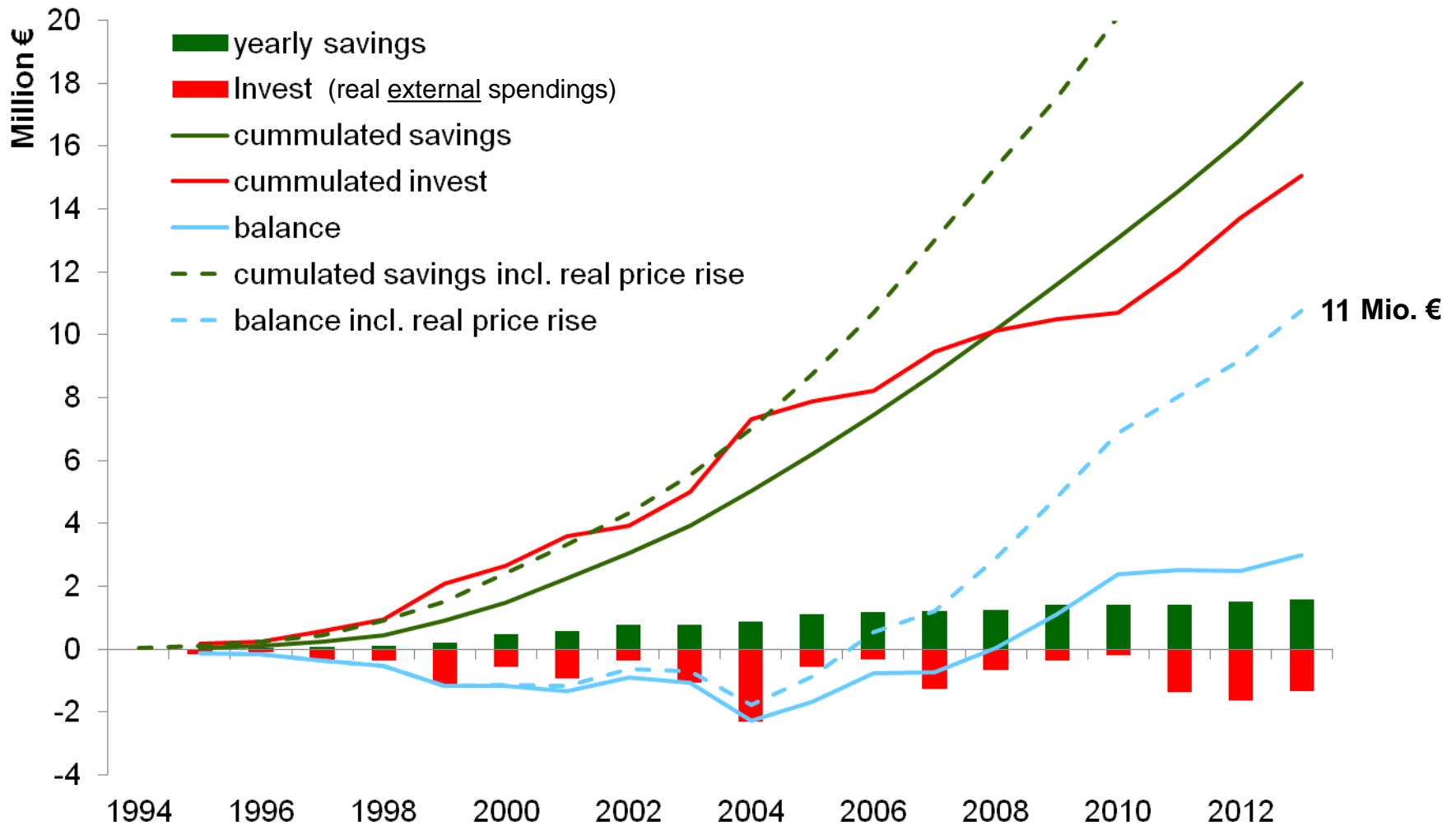




revolving fund – budget & paybacks

Since all savings remain within the overall budget of the same organisation, savings which exceed the required payback can be used to top up the intracting budget.







good reasons for intracting

- Holistic view: intracting links all energy aspects: invest, savings, costs
- Inherent to intracting is the idea of its economic outcome.
This can be promoted to political decision makers.
Further this strengthens the political support of the intracting budget
- An intracting budget can profit of the general political desire to save energy and the climate.
- budgets for direct financing of saving measures cannot be claimed to be refilled after investment and are always in danger of cut-backs .





Stuttgart – Come and visit us.

