Swedish experience of Total Energy Project BELOK

Cost efficient energy saving in existing nonresidential buildings

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Beställargruppen för **Lok**aler

A cooperation for active energy saving
between 16 dominating Swedish
Non residential real estate owners

35 milj m²

It is 25 % of the Swedish
non residential stock

The Goal of the BELOK cooperation

1.

To introduce, try out and improve
new energy saving technologies, solutions and and methods
within the member companies own
management and construction process

2.

To disseminate the by the group tested and improved
technologies, solutions and and methods
to the whole Swedish non-residential building sector

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BYGGHERRARNA
leder svensk samhällsbyggnad

Energimyndigheten

CIT Energy Management AB
A Chalmers industriteknik company

Fabege

MIDROC

VASAKRONAN

CASTELLUM

DILIGENTIA

Jernhusen

Stena Fastigheter

Offices

locum.
VÅRDEN FÖR VÅRDEN

VÄSTRA GÖTALANDSREGIONEN
VÄSTFASTIGHETER

Hospitals

AKADEMISKA HUS

Universities
Research

STATENS FASTIGHETSVERK

SPECIALFASTIGHETER

FORTIFIKATIONSVERKET

LFV

Special premises

SISAB

Göteborgs Stad
Lokalförsörjningsförvaltningen

Schools

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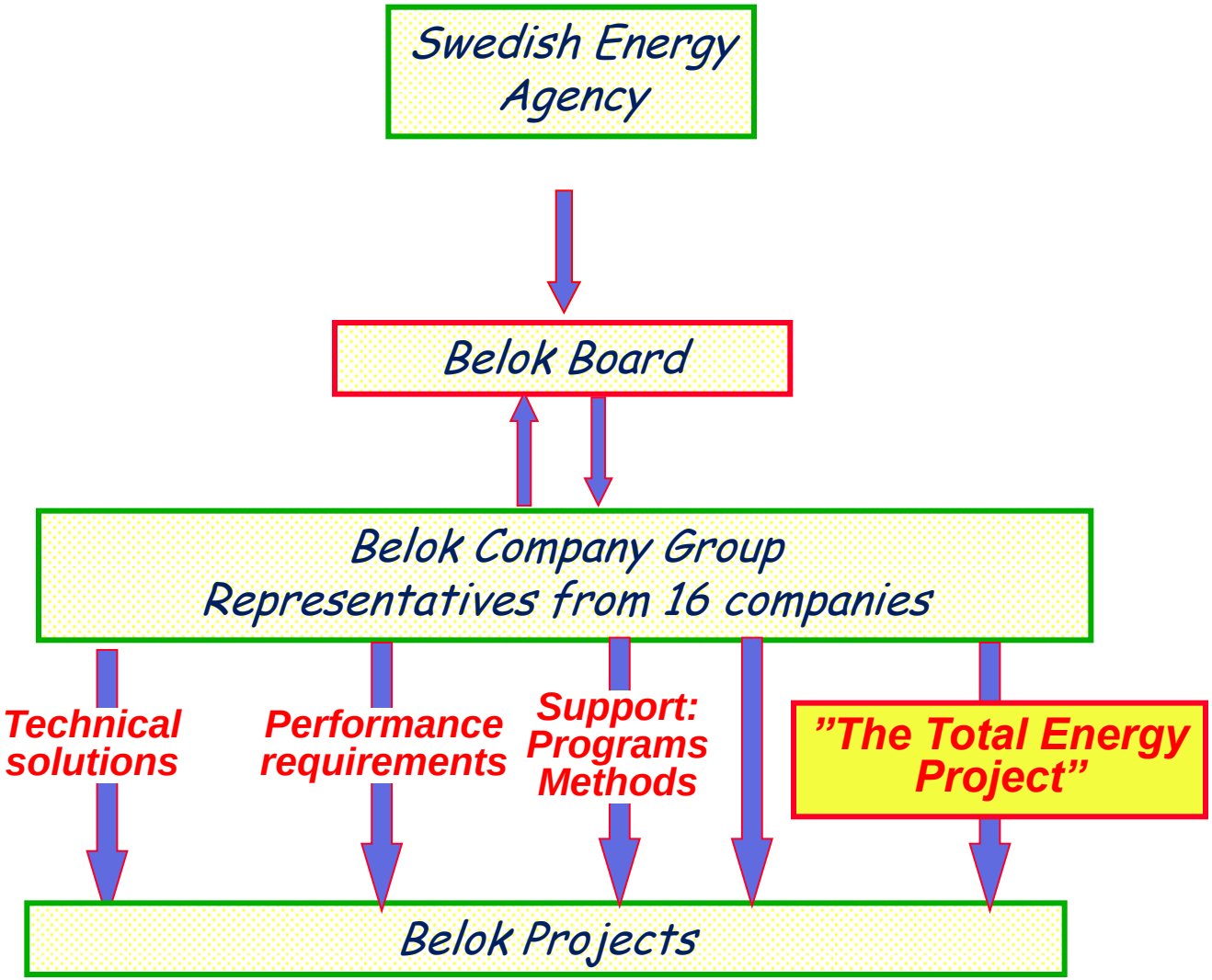
Swedish Energy Agency
Belok Board
Belok Company Group
Representatives from 16 companies
Technical solutions
Performance requirements
Support: Programs Methods
"The Total Energy Project"
Belok Projects

The Swedish building stock

Existing single family houses	190 million m^2
New single family houses	1 million m^2/year
Existing blocks of flats	160 million m^2
New blocks of flats	1 million m^2/year
Existing non residential buildings	150 million m^2
New non residential buildings	1-2 million m^2/year

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The focus of the BELOK Total Energy Project

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Criterion of energy efficiency

1.

The function and quality of the building
must be preserved or improved
by
the measures taken for energy saving.

2.

There must be a balance
between
the resources sacrified for energy saving
and
the real total energy gain

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The BELOK "Total Energy Project"

The purpose is:

to find out and demonstrate:

how much the energy end use can be decreased
in existing non-residential buildings

with measures which are cost effective
according to
the investment strategy of the property owners

The BELOK Total Energy Project

The method is:

to realize
carefully prepared packages of energy saving measures
in existing
office buildings, hospitals, university buildings, schools, etc

The package of energy saving measures must
as a whole
fulfil the profitability demands of the real estate owner

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The BELOK Total Energy Project

Initial Total Energy Projects
Development and tests of the methodology Start 2007

STEP I

A thorough unbiased tehnical inspection of the building for identification of possible energy saving measures.

Estimation of costs and energy savings

Forming of a package of measures that as a whole fulfils the property owner´s conditions for long term investments

STEP II

Application of the whole package in the building

STEP III

Detailed following up the energy end use during 12 months.

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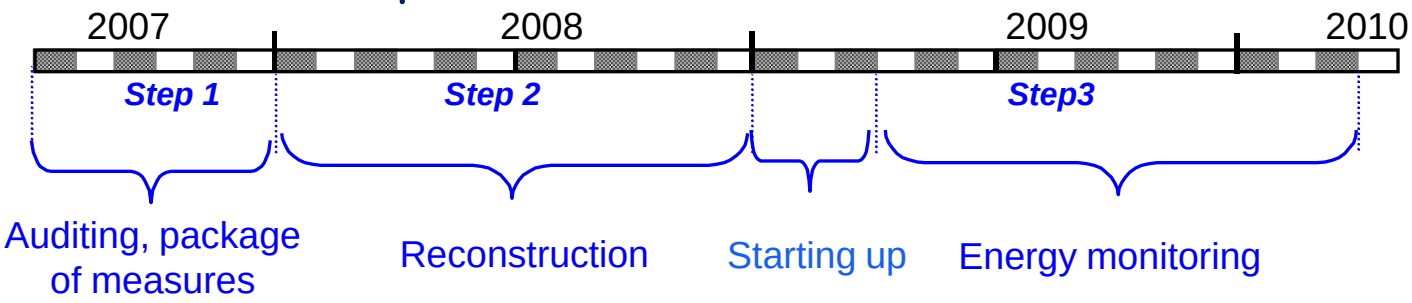
The BELOK Total Energy Project

Initial Total Energy Projects
Development and tests of the methodology Start 2007

3 office building.	30 000 m^2.
2 hospital buildings.	17 000 m^2.
3 primary school buildings.	20 000 m^2

An "optimistic" time schedule



One project is fully finished including one year energy monitoring
Two projects are in the monitoring phase
Three projects are under reconstruction

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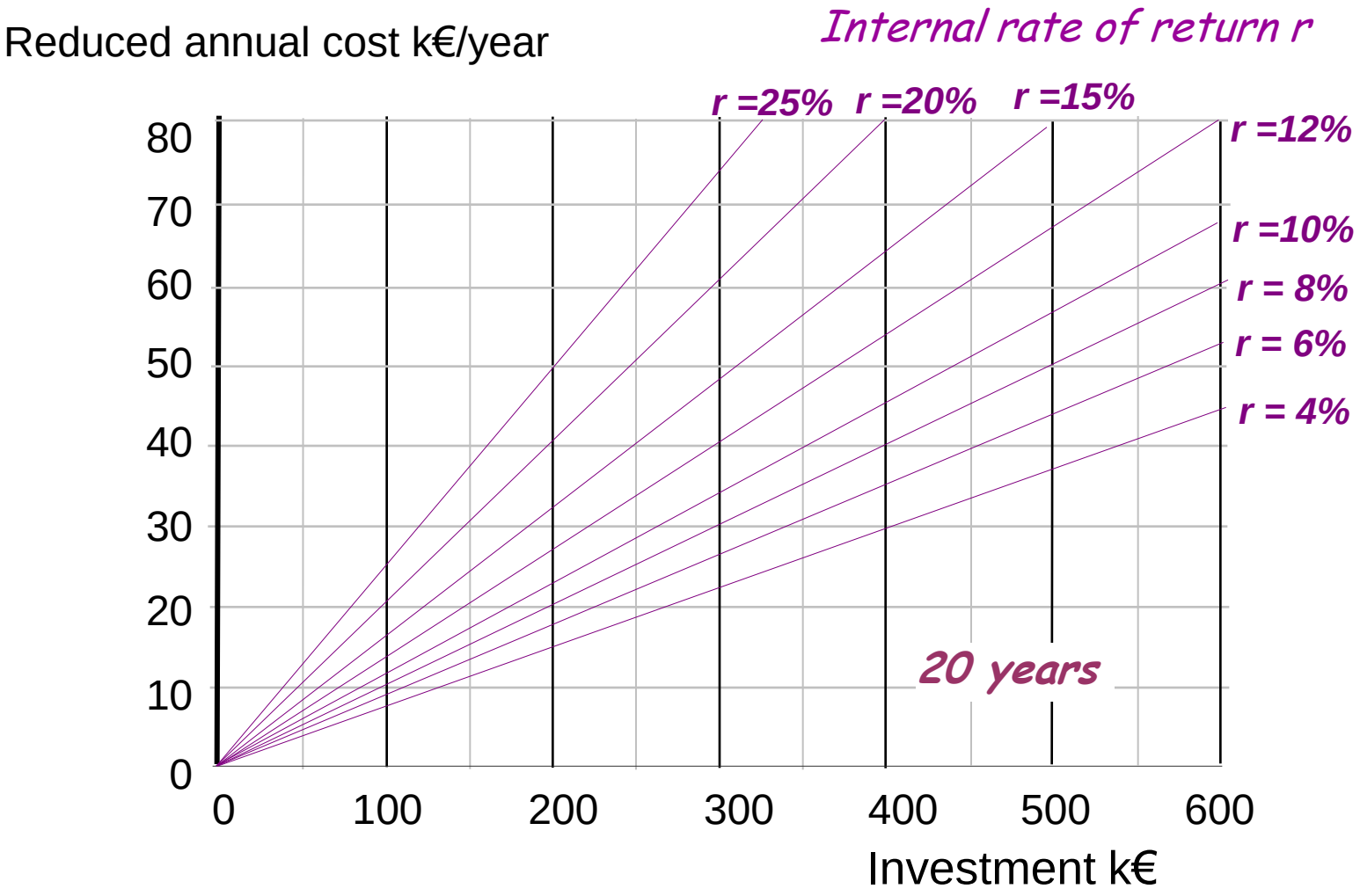
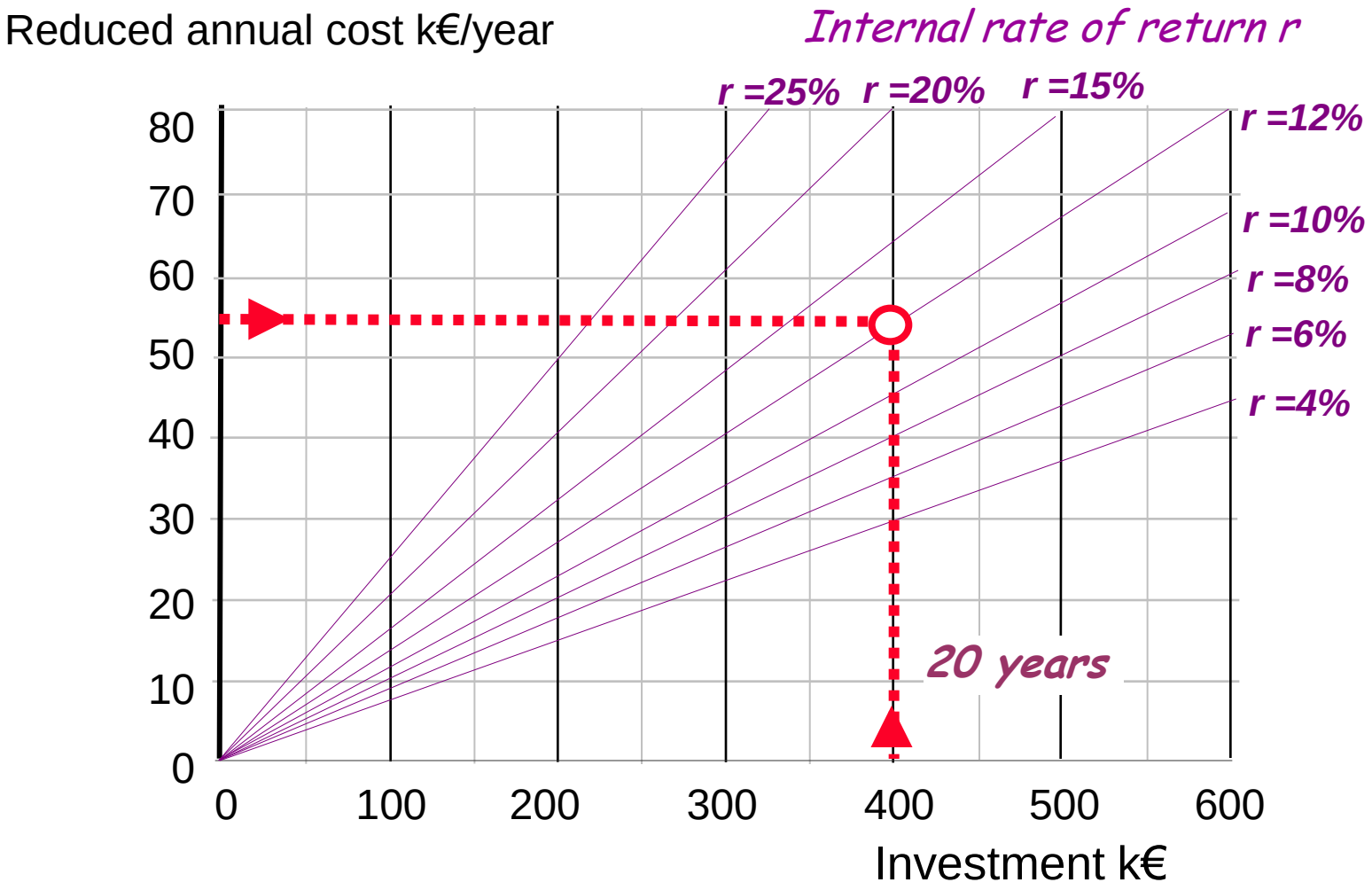
BELOK Total Energy Project

The Investment (€) - Annual Savings (€/a) - graph



BELOK Total Energy Project

The Investment (€) - Annual Savings (€/a) - graph



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Example: Office building "Getholmen" Stockholm

Forming of the package of measures	*2007*
Realization of the package	*2008*
Monitoring of the energy end use	*2009*

***Getholmen*, Stockholm**
Built 1975
8.460 m^2
Offices
Castellum AB

The BELOK Total Energy Project
Project "Getholmen"

Energy saving measures	*Costs k€*	*Savings k€/a*
Introduction of summer time night cooling	0	1.1
Adjustment of the heating system	0	8
Additional roof insulation	20	8
New lighting system in communal spaces	28	15
New air conditioning system	230	21
New windows and frames	130	3.5
Total	***408***	***57***

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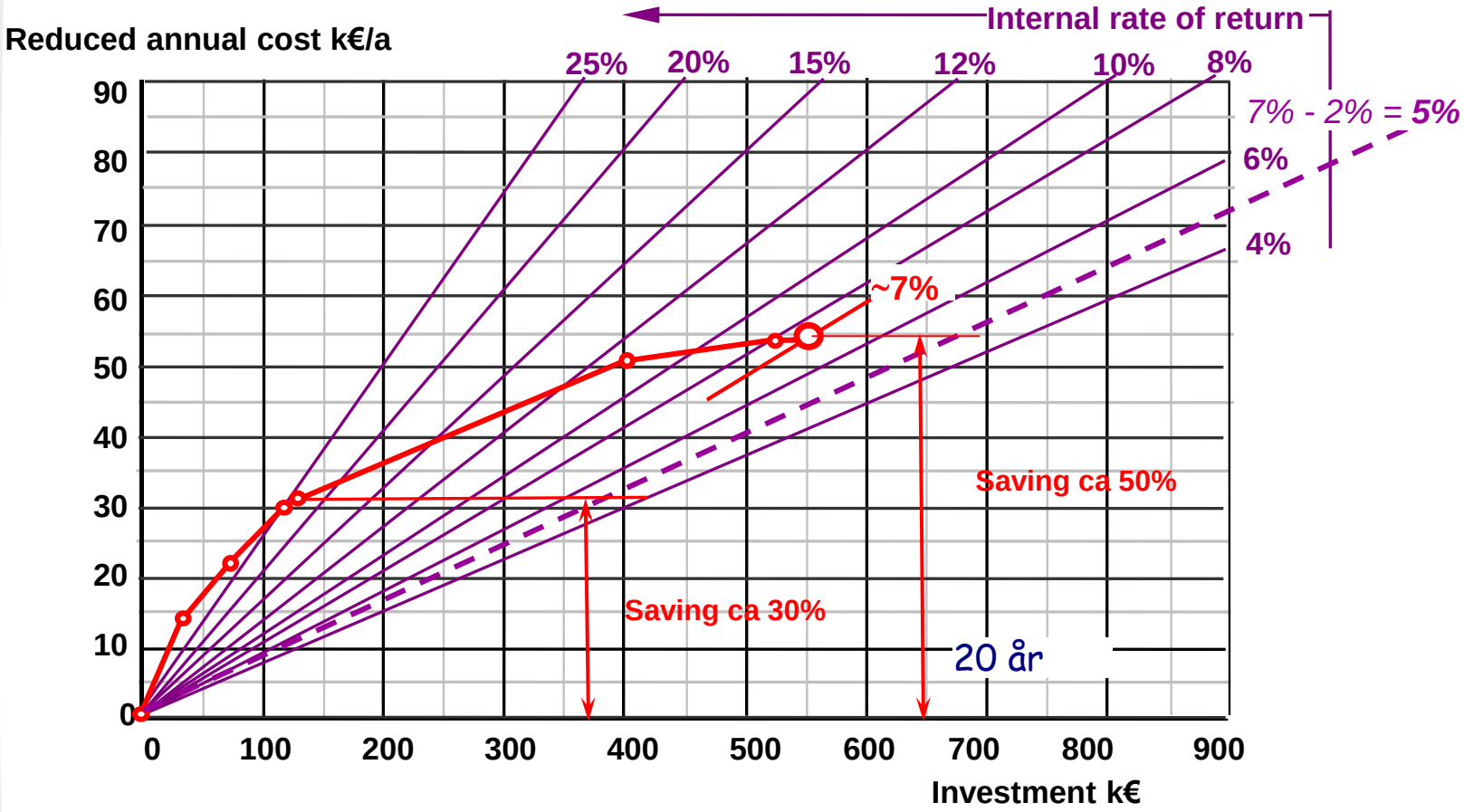
The BELOK Total Energy Project
Project "Getholmen"

Estimated profitability (After Step 1)



The profitability demand was 7% with 2% relative annual energy price rise

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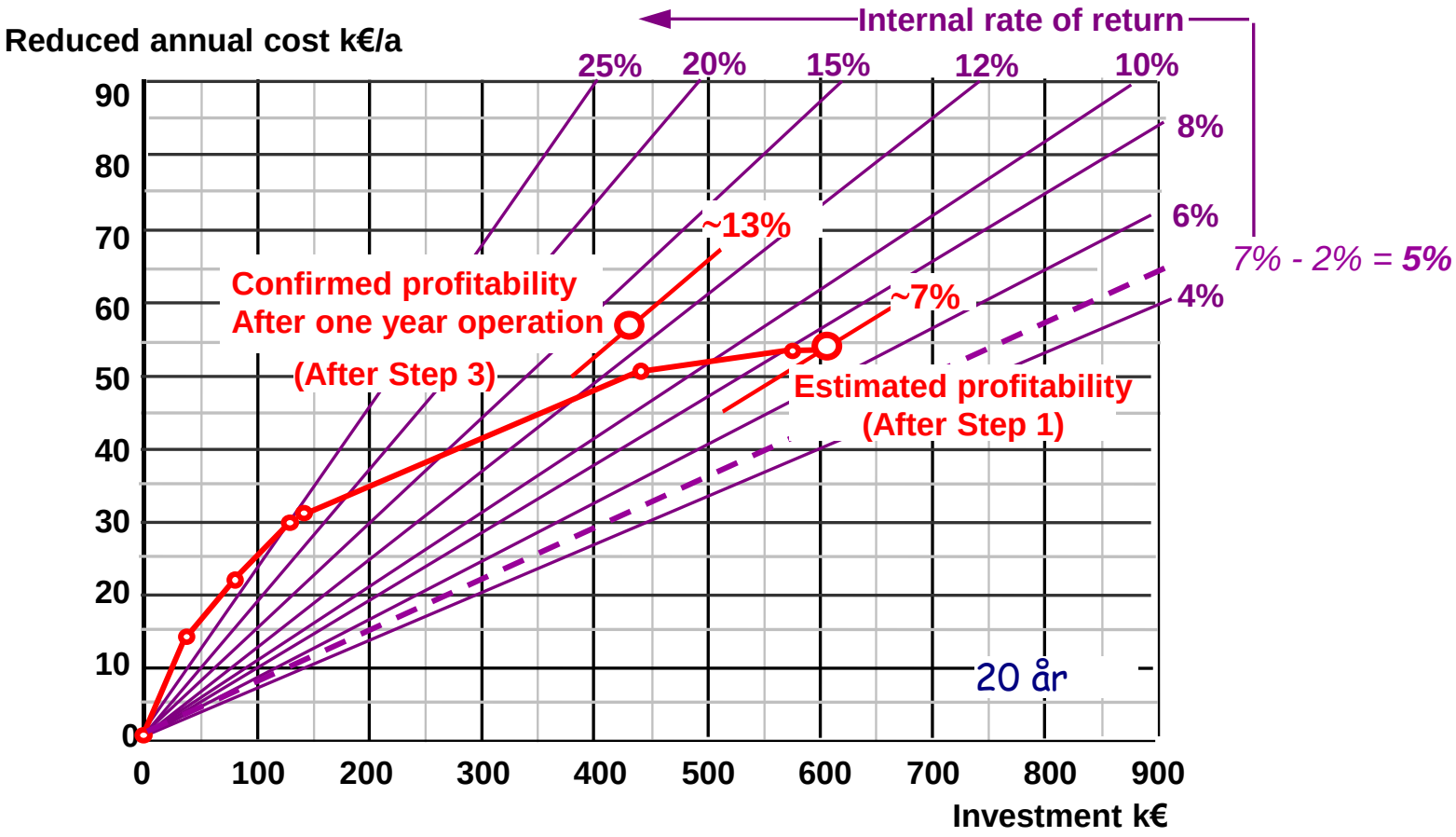
The BELOK Total Energy Project
Project "Getholmen"



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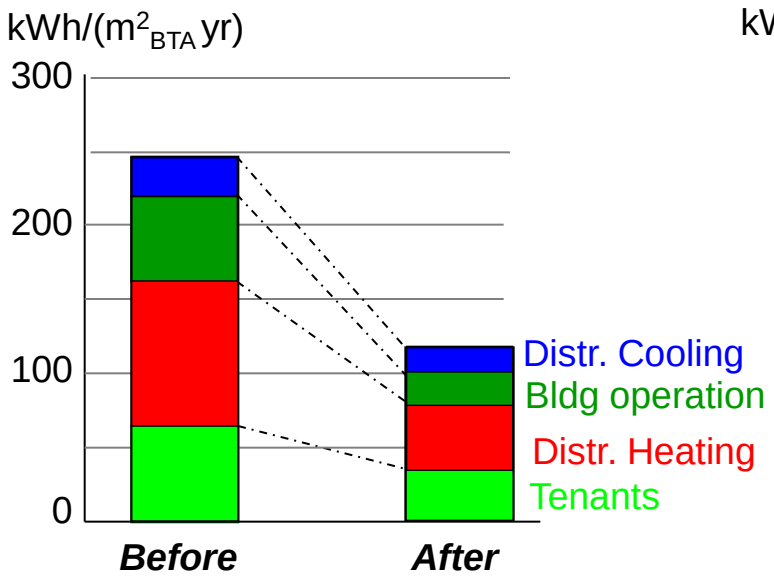
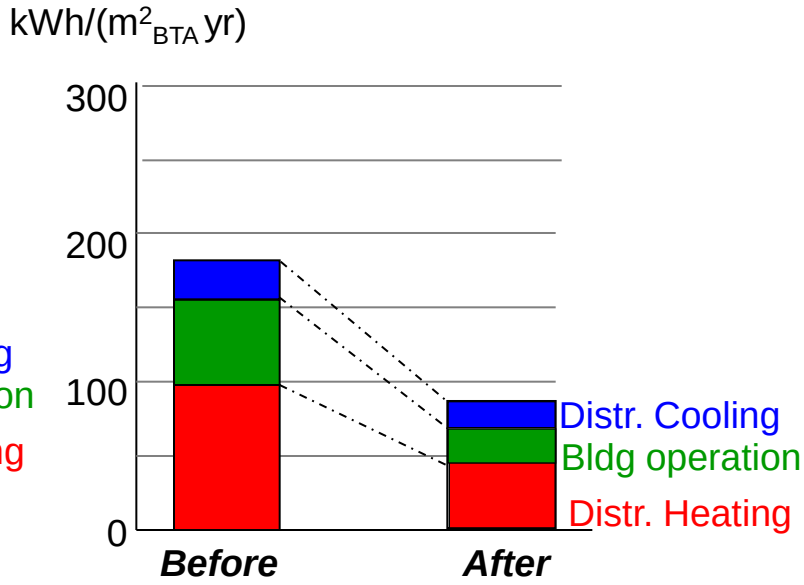
The BELOK Total Energy Project
Project "Getholmen"



The total energy end use



The energy end use for building operation

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Application in broader scale

Projects started 2010.

7 office buildings.	50 000 m^2.
4 primary school buildings.	12 000 m^2.
3 university buildings.	37 000 m^2.
3 hospital buildings.	22 000 m^2.
1 airport terminal.	7 000 m^2.
1 museum.	7 000 m^2.

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The complete cost of Total Energy Projects

Identification of measures Cost estimations Simulations of energy saving	3 - 4 €/m²
Planning and design	2 – 3 €/m²
Construction work, installatons	40 – 80 €/m²
Commissioning, function control	2 - 3 €/m²
In total	47-90 €/m²
Savings	7-11 €/(m²a)

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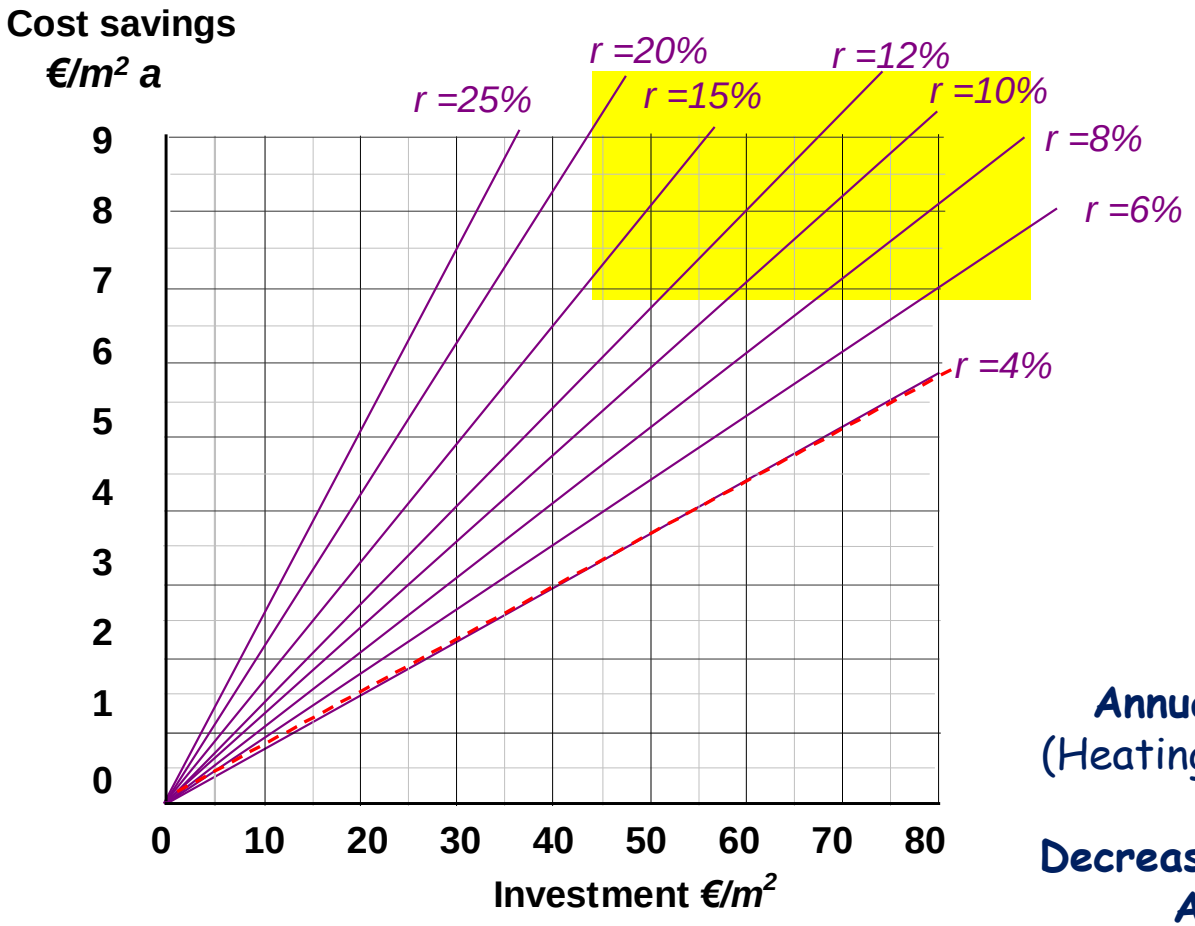
The complete cost of Total Energy Projects



Annual energy end use
(Heating + electrical energy)

Decreased 70-110 kWh/m²
About 40-50%

r = real interest

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Agreement with the property owners

The whole investment has to be carried through (i.e., all the measures suggested)

The real internal interest rate provided by the package of measures has to be in accordance with the economic requirements of the property owner (Agreed upon from the beginning)

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