

# Energy Efficiency Networks for Companies concept, achievements and prospects

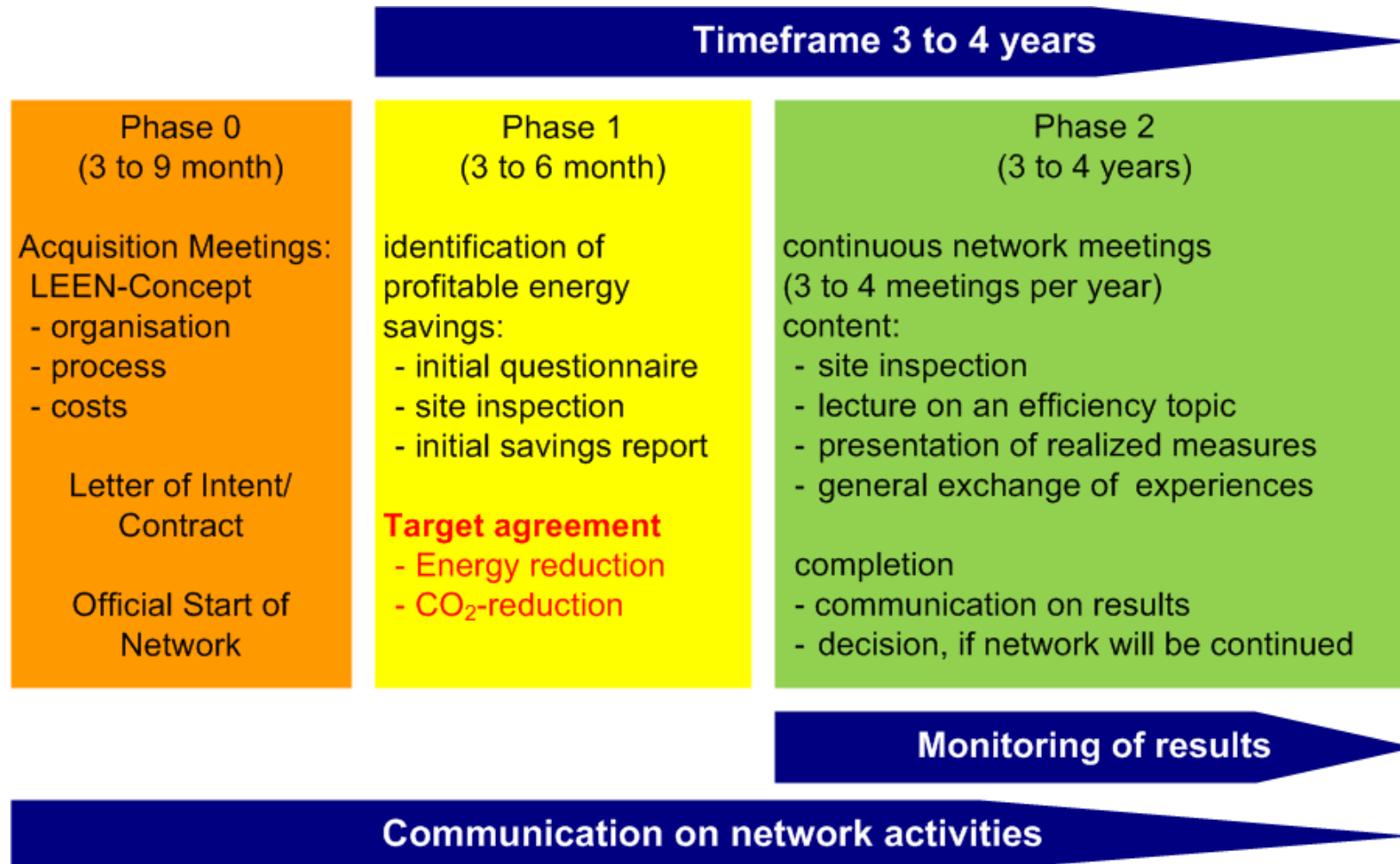
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# Concept: Network participants

1. Initiating institution for the Network  
(e. g. industrial chamber, energy agency, utility)
2. Moderator (LEEN-certified)
3. Consultant Engineer (LEEN-certified)  
LEEN-certified: 3-day workshop for moderators and consultant engineers about the network aspects
4. 10 to 15 companies
  - From different branches
  - Located in one region
  - With minimum energy cost of 150,000 €/a
  - Willingness to share information and to invest
  - Participation in an active and constructive way
  - The management should be included

# Concept: EEN-Network process



# Concept: Advantages of a network

- Compensating a lack of knowledge and market awareness by initial consultancy and expert presentations
- The exchange of experiences leads to lower transaction costs and is spreading new ideas
- psychology aspects
  - energy manager receiving social acceptance from the network colleagues
  - common efficiency and CO<sub>2</sub> reduction target motivates to implement measures
  - professional career enhancement is supported by fast learning opportunities

The energy manager becomes a part of the institution “EEN”

# Concept: Cost of participation (per company or production site)

**General organizational cost:** 1,000 €

<b>Initial consultancy</b>	Cost	(Energy cost per year)
	6,000 - 8,000 €	(< 500,000 €/a)
	8,000 - 12,000 €	(< 2 Mio. €/a)
	To be negotiated	(> 2 Mio. €/a)
	20 days (questionnaire and agreement on report)	

<b>Network meetings</b>	500 € per meeting
	1 day, two persons

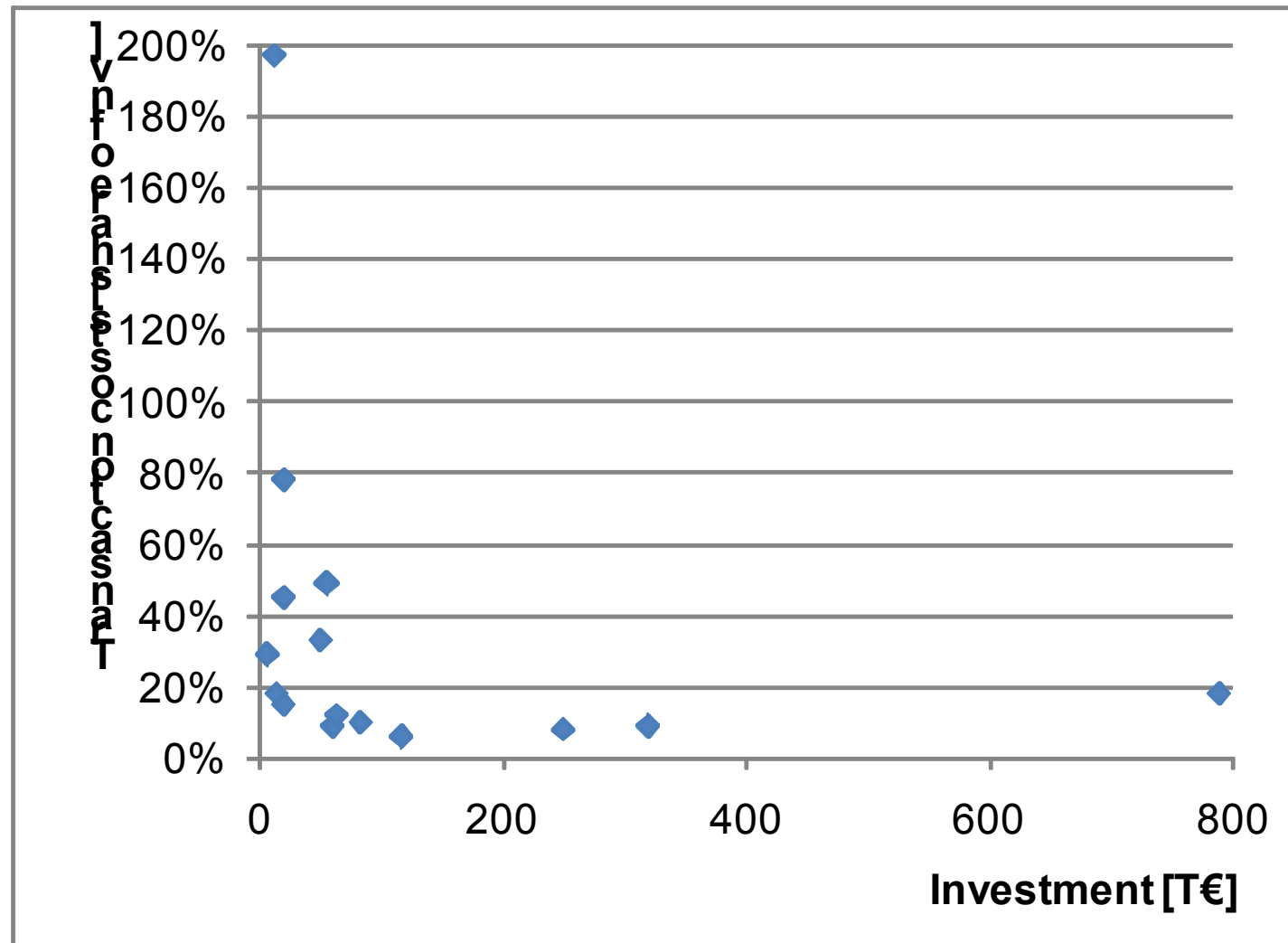
<b>Monitoring</b>	1,500 – 2,500 €/a
	1 day

<b>Sum</b>	<b>25,000 € (initial consultancy: 8,000 €)</b>
	<b>about 60 days (non cash)</b>

# Achievements: General results

- Energy efficiency gain: 2 % per year (average German industry 1%)
- CO<sub>2</sub>-reduction: almost 2 % per year
- Average energy cost reduction: 120,000 €/a per company
- Average CO<sub>2</sub>-reduction : 500 t/a per company
- Six out of the 48 companies received an award
- While 100 measures were planned and implemented, 60 new ideas were born

# Achievements: Transaction costs



# Achievements: Materials

- Handbook (how to set up and run a network)

## Acquisition (Phase 0)

- Model contracts
- Information material

## Consultancy (Phase 1)

- Questionnaire
- 8 out of about 15 Calculation tools  
(common user interface is currently developed)
- Model report, incl. minimum requirements (conform to the EN 16001)

## Network (Phase 2)

- Model report on Monitoring, incl. minimum requirement  
(conform to the EN 16001)
- Calculation tools Monitoring
- Model presentations (various technologies)

# Achievement: Profitability of measures (based on the initial consultancy)

	No of measures	partial investment*	CO <sub>2</sub> -reduction	yearly cost reduction	NPV (i=10%, 20 yrs)	internal rate of return (20 yrs)	static amortisation	dyn. amortisation (i=10%)	energy reduction [% MWh]	CO <sub>2</sub> -reduction
		[1,000 €]	[CO <sub>2</sub> t/a]	[1,000 €/a]	[1,000 €]	[%]	[a]	[a]	[%]	[%]
profitable measures	332	5,260	9,750	2,070	12,360	39.3%	2.5	3.0	7.8%	7.6%
all measures	417	16,000	10,600	2,260	3,720	12.9%	7.1	12.9	13.2%	10.3%

\* additional investment that leads to the energy reduction

**Profitability: internal rate of return > 12%**  
Summarized figures calculated via annuities

# Achievement: Profitability of measures by technologies (based on the initial consultancy)

	No of measures	partial investment*	CO <sub>2</sub> -reduction	yearly cost reduction	NPV (i=10%, 20 yrs)	internal rate of return (20 yrs)	static amortisation	dyn. amortisation (i=10%)
		[1,000 €]	[CO <sub>2</sub> t/a]	[1,000 €/a]	[1,000 €]	[%]	[a]	[a]
<b>lighting</b>								
profitable measures	61	1,224	1,697	343	1,886	27.9%	3.6	4.6
all measures	71	1,356	1,774	356	1,876	26.2%	3.8	5.0
<b>compressed air</b>								
profitable measures	64	860	1,890	371	2,640	43.1%	2.3	2.8
all measures	73	1,052	1,955	391	2,633	37.1%	2.7	3.3
<b>electric devices</b>								
profitable measures	99	710	1,034	262	1,764	37.0%	2.7	3.3
all measures	144	5,126	1,074	421	-1,158	7.2%	12.2	-1.0

**Profitability: internal rate of return > 12%**  
Summarized figures calculated via annuities

# Achievements: Monitoring process

Name of network	Period observed	Energy efficiency gain in %	Reduction of spec. CO <sub>2</sub> -emissions in %	Monitoring method
EnergyModel Hohenlohe	2004 - 2008	8.0	7.5	top-down
Energy network Ulm	2004 - 2007	6.0	24.0 <sup>1)</sup>	top-down
same network without the participating utility	2004 - 2007	4.5	4.0	top-down
Central Germany <sup>2)</sup>	2005 - 2008	8.0	6.5	bottom-up
East-Wurtemberg	2006 - 2008	4.0	4.0	top-down
<sup>1)</sup> CHP: Substitution of natural gas by wood chips <sup>2)</sup> 8 companies out of 13 participating				

# Outlook: Networks in Germany, Europe and worldwide

- 600 to 700 energy efficiency networks in Germany by 2020 are possible (if financial incentives are available)
- Europe is the next step
- The rest of the world can 't wait

# Off topic: The character of energy efficiency investments

- EE investments should be seen as strategic investments
- Compared to production related investments they are **low risk** investments
- EE Investments in EE are mainly long term  
judging them with the same short pay-back periods implies  
**higher profitability requirements** for these investments



**Besides the pay-back period the profitability of an investment should be calculated ( $i^*$ , NPV)**

# Off topic: The profitability gap (pay-back period)

requested pay-back period (static) [years]	internal rate of return $i^*$ [%] <sup>1</sup>												
	period of use [years]												
	2	3	4	5	6	7	8	9	10	12	15	20	25
1	61,8%	83,9%	92,8%	96,6%	98,4%	99,2%	99,6%	99,8%	99,9%	100,0%	100,0%	100,0%	100,0%
2	0,0%	23,4%	34,9%	41,0%	44,5%	46,6%	47,8%	48,6%	49,1%	49,6%	49,9%	50,0%	50,0%
3	neg.	0,0%	12,6%	19,9%	24,3%	27,1%	29,0%	30,2%	31,1%	32,2%	32,9%	33,2%	33,3%
4	neg.	neg.	0,0%	7,9%	13,0%	16,3%	18,6%	20,2%	21,4%	22,9%	24,0%	24,7%	24,9%
5	neg.	neg.	neg.	0,0%	5,5%	9,2%	11,8%	13,7%	15,1%	16,9%	18,4%	19,4%	19,8%
6	neg.	neg.	neg.	neg.	0,0%	4,0%	6,9%	9,0%	10,6%	12,7%	14,5%	15,8%	16,3%
7	neg.	neg.	neg.	neg.	neg.	0,0%	3,1%	5,3%	7,1%	9,5%	11,5%	13,1%	13,7%
8	neg.	neg.	neg.	neg.	neg.	neg.	0,0%	2,4%	4,3%	6,9%	9,1%	10,9%	11,7%
<div> <div></div> <div>profitable investments according to pay-back time</div> </div> <div> <div></div> <div>"forgotten" investments with <math>i^* &gt; 12\%</math></div> </div> <div> <div></div> <div>non-profitable investments</div> </div>													
<sup>1)</sup> constant energy prices over the period of use													

# Q&A

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