Introduction of learning energy efficiency networks (LEEN)

Fourth EMAK Workshop,
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Managing Director LEEN ltd.
# History

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1987</td>
<td>First Network in Switzerland (Zürich)</td>
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<td>2002</td>
<td>First Network in Germany (Hohenlohe)</td>
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<td>2006 – 2009</td>
<td>First concept of a LEEN-Management System</td>
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<td>2009 – 2014</td>
<td>Development of the current LEEN-Management System during the „30 Pilot Network-Project“ (funded by German Environmental Ministry/ NKI Program)</td>
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<td>2010</td>
<td>Start of LEEN ltd. to spread the concept world wide and to further develop the LEEN-Management System</td>
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<td>2012</td>
<td>ISO 50001 conformity for the LEEN-Management System</td>
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<td>50 Networks operating in Germany</td>
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<td>First Networks in Austria (ILL-Werke, ENAMO)</td>
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<td>Pilot Project in China (together with SGCC)</td>
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<td>First steps into the Japanese and Brazilian market</td>
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LEEN-Networks – What does it take?

1. Initiator (e.g. energy agency, industrial chamber, utility)

2. Moderator and consultant engineer (LEEN-certified)
   - LEEN-certification: 3-day training for moderators and consultant engineers including test

3. 10 to 15 participating companies
   - Often from different branches
   - Located in one region
   - With minimum energy cost of 23m JPY
   - Willingness to share information and to invest
   - Participation in an active and constructive way
   - Management should be involved
LEEN-Networks – How does it work?

**Timeframe 3 to 4 years**

**Phase 0**
(3 to 9 month)

- Acquisition Meetings: LEEN-Concept
  - organisation
  - process
  - costs

- Letter of Intent/Contract

- Official Start of Network

**Phase 1**
(3 to 6 month)

- Identification of profitable energy savings:
  - initial questionnaire
  - site inspection
  - initial savings report

**Target agreement**
- Energy reduction
- CO₂-reduction

**Phase 2**
(3 to 4 years)

- continuous network meetings
  (3 to 4 meetings per year)
  content:
  - site inspection
  - lecture on an efficiency topic
  - presentation of realized measures
  - general exchange of experiences

- completion
  - communication on results
  - decision, if network will be continued

**Monitoring of results**

**Communication on network activities**
# Impact: Profitability of identified measures

<table>
<thead>
<tr>
<th>No of measures</th>
<th>partial investment*</th>
<th>CO₂-reduction [t/a]</th>
<th>yearly cost reduction [€/a]</th>
<th>NPV (i=10%, 20 yrs) [€]</th>
<th>internal rate of return [20 yrs] [%]</th>
<th>static amortisation [a]</th>
<th>dyn. amortisation (i=10%) [a]</th>
<th>energy reduction [% MWh]</th>
<th>CO₂-reduction [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>profitable measures</td>
<td>3.118 €</td>
<td>167.378.862 €</td>
<td>321.825 €</td>
<td>60.884.669 €</td>
<td>406.575.705 €</td>
<td>36,0%</td>
<td>2,7</td>
<td>3,4</td>
<td>6,4%</td>
</tr>
<tr>
<td>all measures</td>
<td>5.447 €</td>
<td>307.396.773 €</td>
<td>362.988 €</td>
<td>66.735.348 €</td>
<td>345.211.582 €</td>
<td>22,0%</td>
<td>4,6</td>
<td>6,5</td>
<td>7,3%</td>
</tr>
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</table>

* additional investment that leads to the energy reduction

Profitability: *internal rate of return > 12%*

Summarized figures calculated via annuities

Source: LEEN ltd.
Achieved energy savings in completed LEEN-Networks in Germany (selection)

- Hohenlohe: -20.1% (after 5 years)
- Ravensburg: -12.7% (after 5 years)
- Franken-Oberpfalz: -8.7% (after 4 years)
- Süd-West: -7.6% (after 3 years)
- Hanse: -7.5% (after 3 years)
- Donau-Alb: -7.0% (after 3 years)
- Heilbronn-Franken: -6.9% (after 3 years)

Source: LEEN ltd. / EnBW Sales ltd.
Customer Value – Profitability of LEEN Network participation (example)

Summary of a network with 10 evaluated customers:

• Yearly savings of all 10 companies  180m JPY/a
• Total investment of all 10 companies  310m JPY
• ROI on average: 1.7 years

Source: LEEN ltd. / EnBW Sales
Customer Value – Undertaken measures (selection)

- **Exchange of 250 lights at a production site**
  - Investment: 1.3m JPY
  - Energy Savings: 48% (= 810,000 JPY/a)
  - ROI 1.6 years

- **Exchange of a compressed air system:**
  - Investment: 8.0m JPY
  - Energy Savings: 9% (= 6.9m JPY/a)
  - ROI 1.2 years

- **Improved heat recovery from steam through a new heat exchanging device**
  - Investment: 4.8m JPY
  - Energy Savings: 6.7m JPY/a
  - ROI 0.9 years

- **Heat recovery at a compressed air system through a new heat exchanging device**
  - Investment: 5.2m JPY
  - Energy Savings: 5.3m JPY/a
  - ROI: 1.0 years

Source: LEEN ltd. / EnBW Sales/ Michelin
LEEN-Networks – Who is already taking part? (selection)

- Barilla (Food)
- Bayer Health Care (Pharma)
- Evobus (Automotive, part of Daimler Group)
- Evonik (Pharma & Plastics)
- Hilti (Tools & Machinery)
- Liebherr (Engineering)
- L’Oréal (Cosmetics)
- Michelin (Automotive)
- Procter & Gamble (Food & Non Food)
- Royal Greenland (Food)
- Stora Enso (Pulp & Paper)
- Weidmüller (Engineering)
- Fiducia (IT-Services)
## Concept: Cost of participation (per company or production site) – German example

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost Range</th>
<th>Notes</th>
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<tr>
<td>General organizational cost</td>
<td>114,000 JPY</td>
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<td>Initial consultancy</td>
<td>Cost (energy cost per year)</td>
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<tr>
<td></td>
<td>700,000 - 900,000 JPY</td>
<td>(&lt; 60m JPY/a)</td>
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<td></td>
<td>900,000 - 1.4m JPY</td>
<td>(&lt; 250m JPY/a)</td>
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<tr>
<td></td>
<td>to be negotiated</td>
<td>(&gt; 250m JPY/a)</td>
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<td></td>
<td>20 days (questionnaire and report)</td>
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<td>Network meetings</td>
<td>60,000 JPY per meeting</td>
<td>1 day, two persons</td>
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<tr>
<td>Monitoring</td>
<td>150,000 – 300,000 JPY/a</td>
<td>1 day</td>
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<tr>
<td>Sum</td>
<td>3.0m JPY (initial consultancy: 900,000 JPY)</td>
<td>about 60 days (non cash)</td>
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Rentability of LEEN-Network participation (1/2)

example: customer of plastic branch
(electricity consumption about 14 GWh/a)

- cumulated savings of costs 3 years: 18m JPY
- customer’s investment: 7.0m JPY
- profit after 3 years: 11.2m JPY
- less participant fees network: 2.8m JPY
- less labour time technical leader: 850,000 JPY
- total profit after 3 years: 7.5m JPY
- expected profit for every year recurring: 6.0m EUR/a
- ROI on an average: 15 months

calculation based on electricity price of 7,500 JPY/MWh
We can bring the LEEN-idea to you!

Q&A

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