Business Models for Deep Energy Retrofit in Buildings and Communities

EPC- Project Experience From the Municipality of Halsnæs

Annex 61
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Jens N. Jørgensen
Energy Engineer
Municipality of Halsnæs
EPC - Project Experience

• The Municipality of Halsnæs

• EPC Project (ESCO) Background

• Procurement and Implementation Process

• Lessons Learned

Q & A
The Municipality of Halsnæs
Population in 2013 ca. 31,000
120 km²
60 km from Copenhagen

Halsnæs
Why EPC (ESCO)?

- Environment (climate agreements)
- Maintenance backlog
- Agreement between the Government and the Local Government Denmark (KL) on implementing energy saving measures in municipalities
- Financing
- Guarantee
Why EPC (ESCO)? ....cont.

- Self funding; energy savings fund building upgrades
- No need for additional personnel
- The ESCO guarantee relieves the municipality of economic risk
- All costs for implementing and monitoring are covered
- Common incentive to save even more
Why EPC (ESCO)? ....cont.

Effects:

- Reduced energy costs
- Decrease in carbon emissions
- Reduced backlog
- Energy management (monitoring) until 2021
- Motivation for more energy reduction
- Training/increased competences of the maintenance crew
- Jobs for locally based companies
Phases & Status

Preliminary Study

Tender

Phase 1
Energy analysis & project design
6 months
Nov. 2009 to Apr. 2010

Phase 2
Implementation
18 months
Apr. 2010 to Dec. 2011
(summer 2012)

Phase 3
Guarantee & follow-up
10 years!
Jan. 2012 to Dec. 2021
Tender Conditions

- 20% guaranteed energy savings (electricity and heating)
- 10% electricity savings
- 15% heating savings
- 15% of savings from renewable energy
- 35% of savings from refurbishment or replacement of building enclosures
- Minimum 2/3 share of over performance to Halsnæs Municipality
- Demand guarantee of 25% valued energy savings over 15 years
- 5 years product guarantee
- Training of maintenance crew
## Guaranteed Savings

**Winning bid from YIT**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>28.5%</td>
</tr>
<tr>
<td>Heating</td>
<td>30.7%</td>
</tr>
<tr>
<td>Halsnæs Municipality’s share of savings exceeding guaranteed savings</td>
<td>2/3</td>
</tr>
</tbody>
</table>
## Investment and Expected Savings

<table>
<thead>
<tr>
<th>Project sum</th>
<th>Phase 1 + 3</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>91,4 m DKK</td>
<td>4,87 m DKK</td>
<td>86,5 m DKK</td>
</tr>
</tbody>
</table>

Expected annual savings: 6,2 m DKK

15 years pay back period
Project Organisation

- Steering Committee
- Project Team
- Stakeholders
# Renewables

<table>
<thead>
<tr>
<th></th>
<th>Extent</th>
<th>Expected annual production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar cells</td>
<td>14 locations 3.452 m²</td>
<td>444.100 kWh</td>
</tr>
<tr>
<td>Solar panels</td>
<td>13 locations 440 m²</td>
<td>228 MWh</td>
</tr>
<tr>
<td>Geothermal heat pumps</td>
<td>4 locations 6.600 m²</td>
<td>495 MWh</td>
</tr>
</tbody>
</table>

In addition:
- 23 heat pumps (air/air or air/water)
- 1 mini power station (gas)
- 1 small wind turbine (test)
## Light House Project;
### Renewables

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Investment</th>
<th>Expected annual production/savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind turbine</td>
<td>80.000 DKK Simple PB (test)</td>
<td>2.000 kWh, 2.800 DKK</td>
</tr>
<tr>
<td><strong>20m² solar panels</strong></td>
<td>150.000 DKK Simple PB 11 yrs.</td>
<td>9.900 kWh, 13.900 DKK</td>
</tr>
<tr>
<td>Frederiksværk Sports Hall</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>28m² solar panels</strong></td>
<td>245.000 DKK Simple PB 16 yrs.</td>
<td>7.140 kWh, 15.000 DKK</td>
</tr>
<tr>
<td>Magleblik School</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>450 m² solar cells, ground mounted</strong></td>
<td>1.691.000 DKK Simple PB 19 yrs.</td>
<td>62.650 kWh, 87.700 DKK</td>
</tr>
<tr>
<td>Geothermal heat pump</td>
<td>1.150.000 DKK Simple PB 15 yrs.</td>
<td>441.000 kWh, 76.000 DKK (+126.00 kWh el)</td>
</tr>
<tr>
<td><strong>255 m² solar panels</strong></td>
<td>1.700.000 DKK Simple PB 24 yrs.</td>
<td>123.000 kWh, 70.500 DKK</td>
</tr>
<tr>
<td>ground mounted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical room</td>
<td>600.000 DKK</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>5.616.000 DKK Simple PB 21 yrs.</strong></td>
<td><strong>265.900 DKK pr. year</strong></td>
</tr>
</tbody>
</table>
Lessons Learned - Preliminary Studies

- Shoot for the moon...
- You can’t always know what decision makers think; politicians as well as top management
  Ask them!
- Make the burning platform visible
- Remember to communicate the downsides
- Get support from top management
  Build a good foundation!
Lessons Learned - Tender Process

- Legal & Technical advice

- Client costs for consultants & internal project management overhead are included in the bid

- Tender conditions should reflect project purpose and visions

- Coping with project changes

- Baseline issues

- Calculating over/under performance

- Tender requirements should challenge bidders; just not too much!
Lessons Learned - Analysis phase

- Gathering baseline information is time consuming

- Focus on tasks in phase 2 & 3 while preparing project tools (e.g. spreadsheets)

- ALL initiatives expected to be implemented SHOULD be described and allocated at building level

- Planning of implementation process (phase 2)
Lessons Learned - Implementation

- Focus on PM & implementation manager’s project management skills
- Maintaining team spirit
- Coping with project changes
- Communication & information stakeholders
- Involving maintenance crew
Lessons Learned - Guarantee Phase

→ Follow-up process & energy management

→ Steering committee
  *maintain focus on the project*

→ Involve maintenance crew

→ Baseline adjustment;
  *who, how, when?*
Questions?