"INOGATE Technical Secretariat & Integrated Programme in support of the Baku Initiative and the Eastern Partnership energy objectives"

BUILDING PARTNERSHIPS FOR ENERGY SECURITY

www.inogate.org
The Energy Performance Contracting (EPC) project of the Municipality of Lycksele

2016-02-10
Stockholm, Sweden

Håkan Westman
David Hermansson
Sune Silverhall
Bengt Månsson
Location of Lycksele
Lycksele Municipality

Population: 12 200; 8500 in main town

- Area: 5 636 km²

- Number of buildings:
  - Municipal buildings: 84 nos. 120 919 m²
  - Municipal housing: 97 nos. 99 274 m²
  - Municipal industrial buildings: 16 nos. 29 275 m²

- Temperature Summer, max.: +27ºC
- Temperature Winter, min.: -35ºC
  Average annual temperature: +2ºC

- Degree days: 5565
Municipality head office
What is Energy Performance Contracting (EPC) ?

- EPC is about reducing operative expenses by saving energy in existing buildings
- A typical EPC project is delivered by an Energy Service Company (ESCO) and consists of the following main elements:
  - **Turnkey Service**
    The ESCO provides all of the services required in a comprehensive project
  - **Comprehensive measures**
    The ESCO tailors a comprehensive set of energy efficiency measures to fit the needs of a particular facility
  - **Energy savings Guarantee**
    The ESCO provides a guarantee that the savings produced by the project will be sufficient to cover the cost of project financing for the life-time of the project
  - **Project financing**
    Normally the Client will finance the project. Some ESCO’s can arrange for long-term project financing
Project process

Project process, part one

Initiating the Project

- Client engaging an EPC consultant
- Feasibility study on one typical building, Pilot Project
- Preliminary budget for the total portfolio of buildings; cost-benefit analysis, LCC
- Decision-making

Preparations

- Setting up of project organization
- Procurement procedure
Project process

Project process, part two

Phase 1
Project Development

- Energy audit
- Proposals energy saving measures
- Verification level use of energy, baseline
- Strategy for control systems
- Strategy for verification
- Strategy for operations & maintenance
- Cost budgeting
- Revision of total project budget

Phase 2
Project Implementation

- Design engineering
- Implementation of energy saving measures
- Documentation
- Inspection
- Training operations & maintenance staff

Phase 3
Project Follow up

- Savings monitoring
- Recalculations related to changes in buildings and use of buildings
- Monthly energy-reports
- Annual reports; verification use of energy
- Bonus/Fine statement
- Guarantee inspection

Decision-making
Initiating the Project and Preparations:

- November 2008 - March 2009
- Phase 1: April 2009 - January 2010
- Phase 2: February 2010 - August 2011
- Phase 3: September 2011 - August 2020 (nine years)
Initiating the Project

- Lycksele engaged EPC consultant
- Desk-top Feasibility study including the total building portfolio
- Preliminary budget for the total portfolio of buildings; Cost-benefit analysis, LCC
- The Municipality decided to go in for an EPC Project
Preparations

- Setting up of project organization
  - Project Manager
  - Person responsible for energy statistics
  - Person to coordinate and liaison the operations- and maintenance technicians

- Procurement
  - The Swedish Public Procurement Act was to be followed
  - Decide Public Procurement Award procedure. Either of the following three procurement procedures could have been followed: Open, Selective or Negotiated. In Lycksele Negotiated procedure was chosen
Preparations, cont.

- Decide General Conditions of Contracts to be used:
  
  ABT 06 General Conditions of Contracts for design and Construct contracts for building, civil engineering and installation works, Principal-, Phase 1 and 2 Agreements.

  ABFF 04 General Conditions of Contract for Work in Property Management and Facility Management, Phase 3 Agreement

- Prepare tender documents

- Advertisement

- Qualification; limitation of number of candidates to be invited to submit tender under the “restricted procedure”

- Distribution of basis tender documents
Preparations, cont.

- Organize the competence- and creativity test
- Opening of tenders
- Examination of tenders and award of contract
- Execution of contracts;
  - Principal Agreement
  - Agreement Phase 1
Questions and discussions regarding Initiating and Preparations
Phase 1. Project development

- ESCO undertakes the Energy audit
- ESCO give proposals of energy saving measures
- ESCO give proposals for verification level use of energy, the so-called baseline
- ESCO give proposals for strategy for control systems
- ESCO give proposals for strategy for verification
- ESCO give proposals for strategy for operations & maintenance
- ESCO presents the cost budgeting
- Lycksele prepare revision of total project budget and decide to continue with Phase 2 and Phase 3
- Negotiations
- Agreements for Phase 2 and Phase 3 are prepared and signed
Questions and discussions regarding Phase 1
Phase 2. Project implementation cont.

- Phase 2 Agreement

- Property Portfolio: 63 Properties

- Built up Area: 102 331 m²

- Investment:
  - Cost of the EPC Project: 2 998 000 EUR
  - Cost of additional works: 460 000 EUR
  - Total contract value: 3 448 000 EUR

- Total annual energy saving : 362 915 EUR (20% savings)

- Payback period for the EPC Project: 8,2 years

- Guaranteed annual energy saving 90% : 326 624 EUR
Phase 2 Project implementation

- During Phase 2 the municipality decided to exclude 14 buildings from the project. This has resulted in lower investment and less savings.

- Property Portfolio at the beginning of Phase 3: 49 Properties

- Built up Area: 94,985 m²

- Investment:
  - Cost of the EPC Project: 2,310,000 EUR
  - Cost of additional works: 460,000 EUR
  - Total contract value: 2,770,000 EUR

- Total annual energy saving: 292,868 EUR (17% savings)

- Payback period for the EPC Project: 7.9 years

- Guaranteed annual energy saving 90%: 263,581 EUR
Phase 2. Project implementation cont.

- Examples of energy efficiency measures to be implemented by ESCO according to Agreement:
  - Heating
    - conversion of direct electric heating to district heating
    - replacing thermostats
    - balancing/optimizing heating system
    - replacement of circulation pumps
  - Ventilation
    - replacement of ventilation unit
    - replacement of belt driven fans to direct drive models
    - replacement of heat recovery from the battery to the revolving model
    - air pressure control system
    - control system based on need
  - Lighting
    - replacement of fixtures
    - replacement of light sources; light bulbs, fluorescent tubes
    - lighting controls
Phase 2. Project implementation cont.

- Optimization of the building services according to inside climate requirements and activity timings
  - operating times
  - temperature
  - adjustments according to need
- Climate Control and Communication Systems
  - Installation of new computerized control and monitoring system; connections to main computer, through dynamic update clients.
  - installation of reference sensors for monitoring
- Water supply
  - water saving equipment for water taps and water closets
- Building envelope improvements:
  - roof-insulation
New District heating installation
New ventilation unit
New ventilation unit
New Control Panels
Phase 2. Project implementation, cont.

- Design engineering done by ESCO and scrutinized by Lycksele

- Implementation of energy saving measures
  During Phase 2 the municipality decided to exclude some of the buildings and energy saving measures. This has resulted in lower investment and less savings.

- Documentation

- Payments

- Inspections

- Training operations & maintenance staff
Phase 3. Project Follow up

- Demonstration of the installed computerized climate control and monitoring system
- Phase 3 Agreement
- Savings monitoring
  - Desk-top Rounds
  - Day and Night Rounds
  - Verifying performance of installed equipment
- Recalculations related to changes in buildings and use of buildings
  - Lycksele reporting changes
  - ESCO submit calculations for Lycksele’s approval
- Monthly energy-reports
  - Study monthly reports and hunt deviations and energy thieves
Phase 3. Project Follow up cont.

- Annual reports; verification use of energy, using Excel-sheet
- Complaints of Faults/Failures and their Rectification by ESCO, examples:
  - Lighting Controls does not work.
  - Heat pumps out of action
  - Time channels can not control ventilation unit
  - Ventilation units drop parameter settings during power cut
  - Temperature sensor not show the correct value
  - Uneven temperatures in premises
  - Valves not functioning
- Quarterly and annual meetings
- Guarantee inspection
  - Will be conducted August 2016
  - Savings Guarantee until August 2020
Phase 3. Project Follow up cont.

- Result during the first four years of follow up

2012

- Achieved savings in energy costs: 265,305 EUR (15.5% savings)
- Level above guaranteed savings: 1%
- Level below totally calculated savings: 9.1%
- No bonus no fine

2013

- Achieved savings in energy costs: 307,328 EUR (18% savings)
- Level above guaranteed savings: 17%
- Level above totally calculated savings: 5%
- Bonus to ESCO: 5,806 EUR
Phase 3. Project Follow up cont.

2014
- Achieved savings in energy costs: 288 858 EUR (16,9% savings)
- Level above guaranteed savings: 9,6%
- Level below totally calculated savings: 1,4%
- No bonus no fine

2015
During 2015 Lycksele made major changes in the use of three buildings, resulting in change of the following obligations for the ESCO:
  - Total annual energy saving: 286 376 EUR
  - Guaranteed annual energy saving 90% : 257 738 EUR

- Achieved savings in energy costs: 283 651 EUR (16,9% savings)
- Level above guaranteed savings: 10%
- Level below totally calculated savings: 1%
- No bonus no fine
Questions and discussions regarding Phase 3
General Conclusions of the project

- The Municipality is saving energy costs and thereby getting repayment of the investment
- The project has resulted in better knowledge among operation and maintenance staff
- Less emergency stops
- Better monitoring
- In new building constructions and renovation of existing buildings the knowledge and experience from the EPC is applied
- While installing lighting control systems we include all lighting points in the building
- We stick to keep the inside temperature as per norms. In some buildings higher temperatures had been kept prior to the EPC project. Some persons working in the buildings now complain that it is too cold.