PROBIS

SUPPORTING PUBLIC PROCUREMENT OF BUILDING INNOVATIVE SOLULTIONS

Borlänge kommun (Sweden) Pilot

Prospectus

20150707

REQUEST FOR INNOVATIVE SOLUTIONS

In the PROBIS project, Borlänge municipality and Tunabyggen AB is procuring innovative solutions for indoor climate, ventilation and heat recovery. This prospectus invites to an early market dialogue in order to find the best possible solutions in relation to Borlänge´s needs, but it is also an opportunity to gather information in the making of a tender document for the innovations procurement.

This market requests solutions. Requirements are formulated, but they are only suggested demands in the upcoming tender. As a response, we would like to hear about other solutions or why it might be a better solution available in spite of breaking these suggested requirements.

PROBLEM STATEMENT

The driver behind the procurement and the renovation is to make the buildings that are managed by Tunabyggen more energy efficient. Better and more efficient ventilation and energy management is crucial to reach the objectives. Ventilation solutions are integrated in the need for better insulation, heat distribution and energy management in this type of building. Known ventilation systems do not fit in the building and there is a need for adapted and innovative solutions.

PILOT DESCRIPTION AND BACKGROUND

Borlänge is in the beginning of a long and expensive renovation process of 38 buildings over an estimated time of 10 years. The municipality has an energy reduction target, which means that the renovation must result in drastically reduced energy consumption in these buildings. This could be done by extensive re-building of the houses, but it is not realistic for economic and other considerations.

It is very important to find the most efficient mix of solutions to reduce energy consumption, raise the quality of living and minimize the costs of the renovation.

Studies, based on life cycle costing, have shown that the core in this mix of solutions is a more efficient ventilation system. It is not possible to fit standard system in this type of building and there is a need to find a fitting system or a system that can be adapted to the building.

Since this is the first building being renovated in the prolonged process of renovating the whole area, there is a real opportunity to invest in an innovative solution that will be used in all the houses.

Also, because the whole building needs renovation the ventilation can be integrated in other solutions. This process can therefore result in a functional thinking approach in providing "indoor climate" in an energy efficient way.

Basic Facts of the Pilot Building

Table 1: Basic information

Location:	Tjärna Ängar area in Borlänge.
Type of building:	3-storey brick building. The building type is very typical to the municipality and most other Swedish municipalities
Building Purpose and Users :	Residential building. Mixed aged tenants.
Number of floors **Area**	3 floors. 27 pcs apartments 2136 m2
Built (year):	1970
Average (temp):	22°C (during winter)
Existing energy consumption:	172 kWh/ m2
General description	The pilot building is a residential building located in the north-west part of Borlänge city and namely in Tjärna Ängar area. The area is about 3 km far away from city center. The building is owned by the municipal AB Stora Tunabyggen.

	Tjärna Ängar area stands for 38 identical residential units with over 1300 apartments. Renovation of the whole area is carried out in different stages according to planned schedule. The pilot building dates to the early 70's, about 40 years old. It consists of 3-storey slab blocks with stucco or brick façade with poor insulation. The building has three stairwells so every nine apartments have their own stairwell.
Technical description	The building has flat or low-sloped roofs with leakage problems. The existing windows, as all other parts of the building envelope and installations, with the few exceptions are about 40 years old. The windows are performed by coupled double glazed windows with a U-value = 3, the seals are bad and replacement of windows is needed. In addition a suspected poor insulation of part of the outside wall at the window sill is reported (see Figure 1). Building envelope is not tight. In the current situation, the building has a relatively high flow temperature in the heating system, which argues against any possible option with exhaust air heat pumps as high temperature. The assigned building has no sub-station and a sub-station that supplies three or four houses is placed in an adjacent building. The pipes for the heating and hot water system are drawn in the attic where there is not enough space to address them in a good way. Pipe leakage in the attic of a few cases is reported in general. Most bathrooms contain older two-handle mixers. In addition, hot water recirculation pipes are undersized.
Ventilation:	The current building has mechanical exhaust ventilation, one fan per staircase, supply air through diffusers in the windows. Total flow per stairwells is 300 l/s and forced flow 480 l/s. This system creates many problems, mainly with poor internal comfort.
Heat Distribution:	Hydronic space heating systems connected via heat exchangers to a district heating network (a sub-station with heat exchangers for both heating and hot water for buildings that supplies 3 or 4 houses) from adjacent building which supply the pilot building with heat and hot water. Original secondary one-pipe heating distribution system and original radiators without thermostatic valves are placed in the apartments. The existing heating system has probably reached the end of its design life due to the fact that it already has faced technical complications. One of the issues is that the system puts a lot of time in trying to adjust the heat in buildings at the same time as the heat varies alot.

Figure 1: The pilot building

Energy consumption:

Information about the energy consumption in the pilot building before the renovation is presented in **Table 2**.

Table 2: Energy consumption before renovation

	Before the renovation
Space heating **SHW** (Sanitary Hot water)	115 kWh/m2 51 kWh/m2
Electricity (building electricity excluding household) • lighting • non lighting	6 kWh/m2
Total	172 kWh/m2

Actual costs

The size of the problem in financial terms, directly related to the pilot building before the renovation, can be found in **Table 3**.

Table 3: Energy costs before renovation

	Before the renovation
Space heating **SHW**	334855 kWh (ref. year 2013)
Electricity (building electricity excluding household) • lighting • non lighting	13120 kWh total (ref. year 2013)
Maintenance cost (average/year) • **HWAC maintenance** • **Envelope maintenance** • **Indoor Lighting System** • **Others**	
Total	

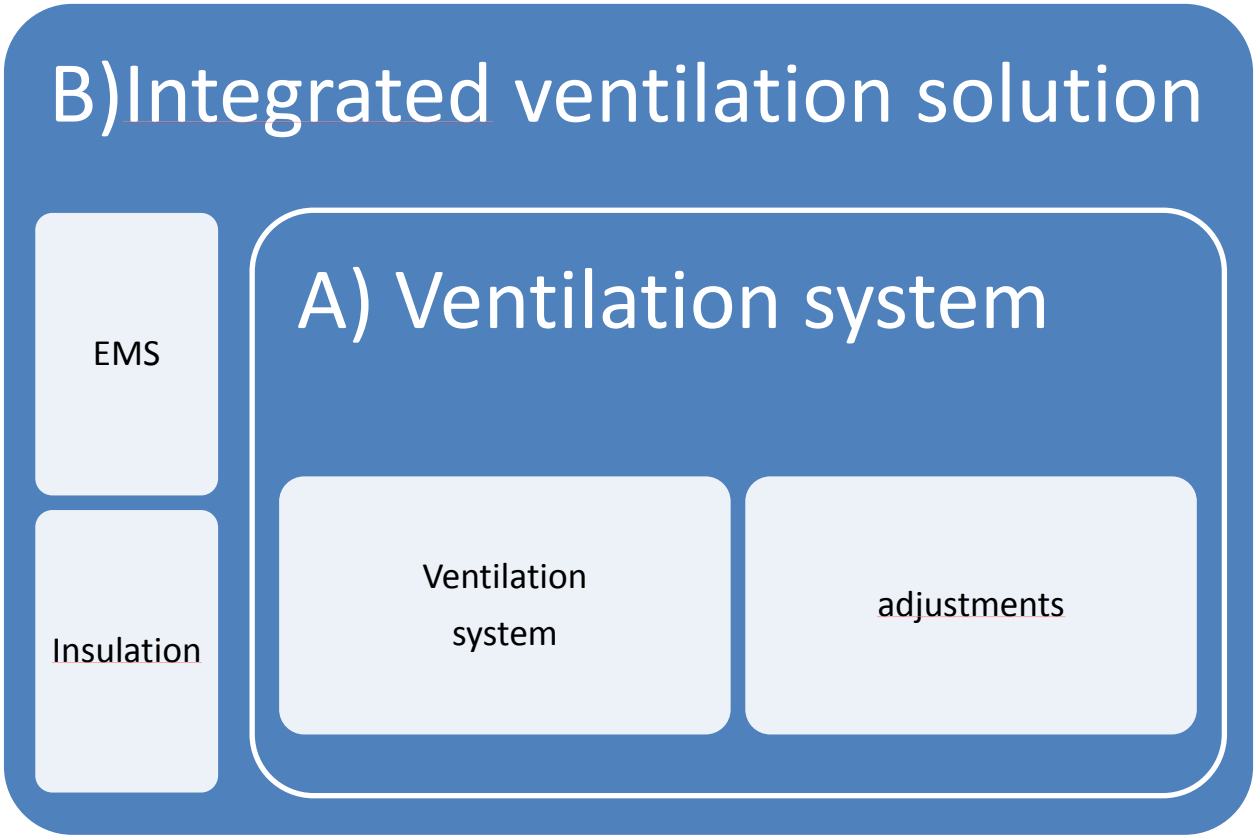
DESIRED SOLUTION DESCRIPTION

The desired solution is an energy efficient ventilation system integrated in the whole building and in the process of renovation. This Prospectus presents a description of the building renovation and all needs in that process related to an energy efficient integrated ventilation system. The description of demanded solutions is presented in order to show how ventilation must fit into the other needed solutions for the building. It also aims to open up the possibilities for other combinations of solutions that might work or perform together in order to achieve to the most cost effective performance of the ventilation system.

In the process of finding innovative solutions, the pilot partners in PROBIS are analyzing and challenging their needs in order to find the core functional needs and to open up to new solutions. The scope of the procurement is not set until after the market dialogue.

The procurement can follow three different scenarios:

A. Ventilation system only
B. Whole ventilation system solution and all needed changes adaption/integration in the house, like insulation, air-ducts, windows, air-flow etc.



a) A procurement of ventilation system covers the systems needed for recovering heat, including components and measures relating to ventilation air in existing apartment blocks. This includes conversion of existing ventilation systems (exhaust mechanical ventilation) for recovering.

b) While a procurement of an integrated ventilation solution embraces a complete system for recovering heat, including installation and other measures needed for installation (e.g. sealing of climate screens, additional insulation, construction of fan rooms, preliminary adjustment, etc...).

In addition to the requirements for technical procurement it is necessary that a complete competitive tender also want to include an otherwise complete and well-functioning heating and ventilation system which complies with legal requirements when modifying buildings, e.g. duty of care, accessibility, fire regulations, etc, i.e. laws and ordinances in force shall apply.

In this Prospectus, the functional requirements are listed, but not all of them are specified and have specified measurements.

The requirements can be used in the procurement as absolute requirements or as requirements where the level of compliance or performance is awarded in the evaluation of the tenders.

In the upcoming Procurement, the scope and requirements for the procurement will be set and there will be commercial conditions for a full procurement of solutions.

Below is a list of functional and performance requirements that's considered for the procurement. **All requirements on the list might not be included in the procurement** and there might be additional ones. This list and the prospectus is an invitation to influence what requirements that will be used in the final version of the procurement.

Owner requirements	Functional Requirements	Performance Requirements
A) Ventilation heat recovery system	- Ventilation heat recovery for energy savings. - Ability to monitor, control and manage and report thermal, electrical consumption and internal comfort in a simple and smart way. - Ability to be compatible with present and known future ICT standards and protocols (interoperability). - To what level the solutions can be integrated with standard components and devices of other supplier. - Control strategy that supports the process of having the best indoor climate conditions at the lowest energy costs. - The solution can be integrated with building energy management system. - Any solution and its associated components and their spare parts shall be within the available budget and the status of the building. - Connectivity to ducts is included. - Ability to adapt to indoor climate solutions.	- Assure an efficient and satisfactory degree of air conditions & thermal comfort for the tenant's winter time and also in summer time. - Assure availability and functionality of all technical solutions with reference to the climate conditions that apply in Sweden/ Borlänge. - Ability to report any failure in the heating and ventilation, DHW and the energy management systems to the monitoring center immediately. - Environmental friendly products. - The solution allows the recovery of the highest amount of energy. - Low invasive of involved solutions that does not occupy large rooms. - Average reduction in energy consumption up to the 35%.
B) Ventilation system solution…	- Ventilation heat recovery for energy savings. - Ability to monitor, control and manage and report thermal, electrical consumption and internal comfort in a simple and smart way. - Ability to be compatible with present and known future ICT standards and protocols (interoperability), and can be integrated with further components and devices of whatever supplier. - Control strategy that supports the process of having the best indoor climate conditions at the lowest energy costs. - The solution can be integrated with building energy management system. - Additional insulation of part of the outside wall at the window sill.	- Assure an efficient and satisfactory degree of air conditions & thermal comfort for the tenant's winter time and also in summer time. - Assure availability and functionality of all technical solutions with reference to the climate conditions that apply in Sweden/ Borlänge. - Ability to report any failure in the heating and ventilation, DHW and the energy management systems to the monitoring center immediately. - Environmental friendly products. - The solution allows the recovery of the highest amount of energy. - Low invasive of involved solutions that does not occupy large rooms. - Average reduction in energy consumption

	- Any solution and its associated components and their spare parts shall be within the available budget and the status of the building. - New ducts are included. - Lightweight and approved construction materials & installation techniques that suits the selected technical solutions and its applications. - Ability to adapt to indoor climate solutions. - Energy efficient windows and frames. - Sealing of building envelope.	up to the 35%.
Management phase	- Considerably simple & short time installation. - Silent and quick drilling in the bldg. as much as possible without evacuation of tenants. - Safe working area with all needed equipment that support safety of tenants and workers as well.	- Short time for installation of all technical solutions with the minimum interference and disturbance to the tenants. - Time for evacuation will be evaluated 8h/24h/48h. - The installation phase shall guarantee tenants´ safety and assure that they can do their daily job and movement with minimum restriction/ disturbance.
Maintenance phase	- Considerably easy maintenance and reachable heating and ventilation system and EMS solutions. - Using well-known components and equipment that will be available in the local market for at least 10 years' time.	- Minimum time interference and disturbance to tenants. - Minimum maintenance routines per year. - Ability to respond to any reported failure within 2 days max.
Disposal phase	- Traded equipment, components and devices shall be in accordance with the Environment Product Declaration (EPD) standards. - Evaluation, of any solution, in terms of life cycle costing assessment.	- Removal of surplus or obsolete hardware materials and waste and products including the transfer and the disposal to an approved center, should be in accordance with the existing law. - Minimum time for disposal or removal of any surplus or obsolete hardware or any waste materials.

User requirements	**Functional Requirements**	**Performance Requirements**
Running phase	- Tenants should not be disturbed by the new ventilation solutions. - Better internal thermal comfort in the building winter time but also in summer time. - Easy running and reachable system, good operational availability. - User friendly solutions/ interface allow them to interact in energy management and control. - The solution can operate in several temperature ranges.	- Min 90% of tenants are happy and do not complain. - Assure availability, reliability and functionality of all technical solutions. - Reach a stable and good internal thermal comfort in shortest time possible. - Minimum nr. of failure per year for the heating and ventilation, DWH and the energy management systems.

KPI and CONDITIONS DESCRIPTION

Related to the solution performances	
KPI S.1	To cut the current energy consumption from 172 kWh/m2 to the halve; kWh/m2.
KPI S.2	To reach a good and acceptable air room temperature and air quality.
Related to the refurbishment process	
KPI P.1	Increase of the internal thermal comfort.
KPI P.2	Minimum nr. of tenants complaints.

Conditions A - related to the performances:

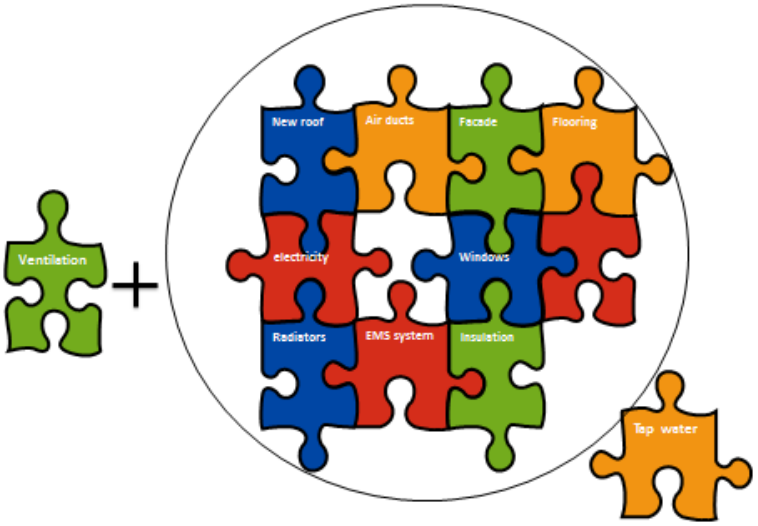
These are conditions that might be limiting or excluding known possibilities for the solution. It could also be conditions that hinder the full potential of the solution.

- The building envelop is not tight, and could limit the optimal efficiency of an FTX-system performance.
- Poor room space for any possible heating and ventilation/ DHW system & any new ducts (supply and exhaust) in the present attic. Besides this, there is no duct system that matches this system in buildings.
- The building have relatively high flow temp in the heating sys., which might argue against any new tech. solution.
- Common cold water meter dedicated for the building.
- Missing broad concept of heating pipes in the buildings.
- In the current bldg. there is no sub-station.
- It is one-pipe heating system thus difficult to adjust.
- Different hot water pipe lines serve one apartment.
- The present roof is leaking.
- Any additional insulation of the external walls or roof must take into account the rapid changes in temperature and buildup of moisture in the material.

Conditions B - related to the refurbishment process:

These are conditions related to process and timing for the procurement. Solutions are only interesting if they match the scope and timeframe of: this project, the plan/process for the building, and the procurement process of the municipality. The output should include limitations in implementing the solutions.

The procured solutions must fit in the overall process of renovation and it is only a piece in the "renovation puzzle". As such, it must be flexible to the other pieces.



- Tenants should stay at their homes during renovation.
- If there is evacuation, it should be short and scheduled to other evacuation needs for the renovation.
- Dismantling of the old system and its associated costs?
- Procurement must be done in fall 2015 and implementation shall be ready in spring 2016.

Additional information:

The PROBIS project will organize at least three open market consultation sessions with the supply side and with leading developers –one of this in Sweden. The workshops are part of the preparations for procurements for the pilot partners and also part of an analysis of the State-of-the art at EU level.

"Meet the Market" event in Gothenburg will be organized by Borlänge kommun together with Tunabyggen and SP Technical institute of Sweden and will be held at 16th of September 2015, SP Technical research institute of Sweden, Eklandagatan 86, Gothenburg. The main objective of the event is to better understand the innovations available on the market for indoor climate and ventilation in residential buildings.

It is worth to be mentioned that this "Pre-information notice" gives some instructions for the future contract and does not represent a formal commitment for the future execution. It also is not part of any pre-qualification or selection process.