



D 4.1 Implementation of models of coordination

Logirep



Logirep, December 2012

PART I PILOT PROJECT TECHNICAL DESCRIPTION

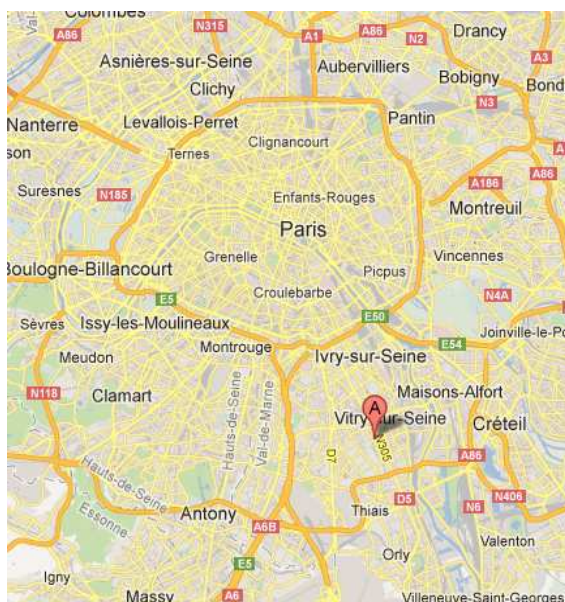
1. Description of the pilot building

The Saussaie residence was built in 1966. There are 4 apartment blocks of 6 to 10 stories, for a total of 231 social rental dwellings.

Vitry Saussaie		
Address	1/3/5/7/9 Allée du Cèdre 2/4/6/8/10 Allée des Erables 15/17/19 Rue Petite Saussaie 94 400 Vitry/Seine	
Year of construction	1966	
Type of building	Apartments in a block of six to ten stories	
Number of dwellings	231	
Tenure	Social rental	

Geographical situation

The Saussaie residence is located in the city of Vitry-sur-Seine, in the southern suburbs of Paris. It is about 10km to the south of Paris.

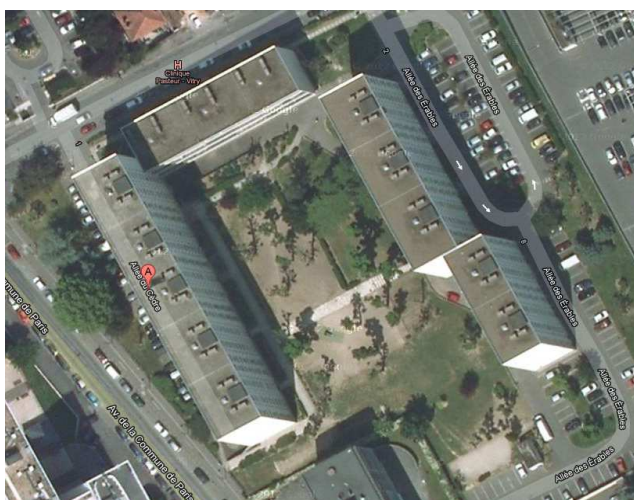


General building general characteristics

Construction characteristics	Prefabricated concrete
HVAC system	District heating, Natural ventilation
Energy performance before renovation	242 kWh/m ² /year
Expected performance after renovation	65 kWh/m ² /year

The Saussaie residence was built in 1966. No refurbishment project has been developed since. There are 4 apartment blocks of 6 to 10 stories, for a total of 231 social rental dwellings.

Ground floors are occupied with shared units and closed boxes.



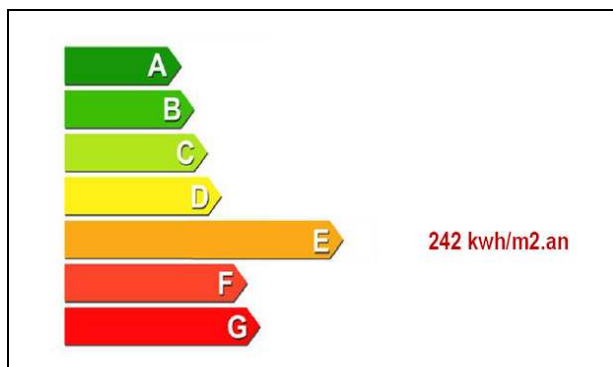
Construction characteristics

The quality of the construction and the finishing materials is good. Since 1966, no refurbishment works have taken place. Therefore, the following elements are still in its original configuration:

- Prefabricated concrete non insulated walls
- Single glazed and wood window frames
- District heating for heating and hot water supply
- Natural ventilation

Energy performance before improvement

According to the energy performance assessment performed by the construction company prior to the refurbishment works, the Saussaie residence has been estimated to 242 kWh/m²/year which corresponds to class E.



2. Description of the refurbishment project

Description of general works

The Saussaie residence refurbishment is a whole building renovation including energy works and common refurbishment works. The final energy performance expected is 65 kWh/m²/year (theoretical calculation), and 40% of energy savings, meaning 145 kWh/m²/year of real measured consumption. The works include 4 million euros of energy works and 5 million euros of common refurbishment works.

Common refurbishment works include:

- Common areas refurbishment
- Green areas restructuring
- Dwellings upgrade to current comfort and security standards

In addition, 6 dwellings for disabled people are created at the ground floor.

Whole renovation investment in €		Energy renovation investment in €		% of renovation investment dedicated to energy saving measures
Total	Per dwelling	Total	Per dwelling	%
9M€	39 000	4M€	17 300	45%

Description of energy works

Energy works include:

- External insulation 12cm ($R=3.75 \text{ m}^2 \cdot \text{K/W}$ – $U_p=0.26 \text{ W}$)
- Low emissive double glazing, PVC frame (4/16/4 low emissive argon, $U_w < 1.4 \text{ Wm}^2 \cdot \text{K}$)
- Improvement of air tightness
- Heating and hot water: the district heating network is maintained, with a modification of the heat exchanger in order to obtain a better temperature regulation per building.
- 128 m² solar thermal panels for water heating.
- Planted roof for one of the buildings

Name of the energy saving measure	Saving		Necessary investment	Repayment period	Reduced CO ₂ emissions
	kWh/year	€/year	€	years	t/year
Insulation external walls	2143727	85749	1486552	17	464
Low emissive double glazing, PVC frame	623829	24953	1325733	52	134
Roof insulation	41980	1679	98242	39	9
Lower floor insulation	63053	2522	40755	12	14
Humidity controlled ventilation	11102	444			2,8
Total:	2883691	115347	2951282		623,8

Renewable Energy installed	Energy produced		Necessary investment	Repayment period	Reduced CO ₂ emissions
	kWh/year	% bdg needs	€	years	t/year
Solar thermal panels	70274	30	147200	14	14,3

Tendering procedure: design-construction-maintain + guarantee of performance

The Vitry residence is the first experience in Social Housing in France of an integrated design and realization with guarantee of performance. Maintenance is contracted during the works + 4 years after the works. The formal contract awarding procedure is a restricted procedure, where invited companies/consortia can submit a tender.

Integrated design tendering procedure

The preparation of the tendering demanded an important in-house effort and took longer than a standard tendering procedure. Logirep needed 6 months to launch the tender. One month was then needed to analyze the offers. An external company was contracted for assisting in the analysis of the 5 received offers. This was necessary due to the complexity of the award criteria and to the need of keeping an objective analysis by a third party. Non-retained candidates had an economical compensation.

The following award criteria were used:

1. Price (30%)

2. Energy savings proposed (10%)
3. Energy saving measures proposed (15%)
4. Obtaining of the French BBC certificate (high energy performing building certificate corresponding to a theoretical consumption of 104 kWh/m²/year) (5%)
5. Technical report (25%)
6. Architectural quality of the project (15%)

All candidates were large general contractors. The selected consortium includes an architect, an engineering company, a general contractor (head of the consortium), a maintenance company, and a social worker, in charge of the relationship with the tenants.

Guarantee of performance

The awarded consortium guarantees 40% of real energy consumption reduction with regard to a “0 level” that was assessed by an independent engineering firm and included in the tendering procedure. The tendering asked for 30% of energy reduction (also fixed by an external assisting engineering firm). We speak here of real energy consumption for heating and hot water, not estimated consumption. Therefore, the behavior of the tenants has an influence on the contracted performance. This is a risk that is assumed by the group. The social worker is in charge of working with the tenants in order to push for a responsible behavior in regard to energy consumption.

The first year is a “test year”, no penalties are applied in case of under-performance. The solar results guarantee is settled. After the “test year”, if the reduction of energy consumption is greater than contracted, the gains are shared 50/50 between the consortium and the tenants. In case of underperformance, 100% is supported by the consortium.

No feedback can be provided at this stage on the guarantee of performance, since works are not finished.

Planning of the project

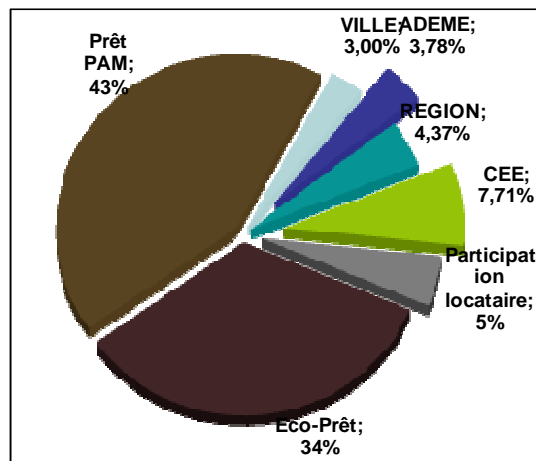
- **January 2010:** internal program definition
- **June 2010:** tendering of the design-construction-maintenance – 5 candidates selected
- **July-August 2010:** definition of the offers by the selected candidates
- **September 2010:** Analysis of the received offers by Logirep
- **October 2010:** Selection of the candidate
- **2 December 2010:** signature of the design phase
- **21 September 2011:** Start of the works
- **March 2013:** end of the works

	2010												2011												2012												2013		
	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March
LOGIREP	Inception					Integrated design tendering							Design												Construction														

Financing scheme

The financing scheme is the same as for a “business as usual” renovation project:

- Grants from the city, the region and the French energy agency
- Loans (eco-loan and loan for renovation works)
- Energy certificates
- Tenants participation



The participation of the tenants goes via a new system called in France “the third line of the bill”, which consists in recovering for a given period of time from the tenants a % of the reduction of the energy bill, as a mean for paying the renovation works. In this case, it corresponds roughly, depending on the size of the dwellings and real consumptions, to 12€/month during 15 years.

Tenants management

Tenants have been consulted three times:

- At the design phase: tenants have been associated to public meetings, and technical meetings have been organized with the tenants representative. Besides, a social survey has been launched and finalized in June 2011
- During the works: a website www.sausaie-vitry.com and a renovation guide for the tenants
- After the works: follow-up of the tenants consumptions via a software “Efficonso” and a monitoring in each dwelling (energy metering and temperature measurement devices). A website for best practices exchanges will also be developed.



PART II IMPLEMENTATION OF THE ALTERNATIVES TO THE CURRENT COORDINATION MODEL

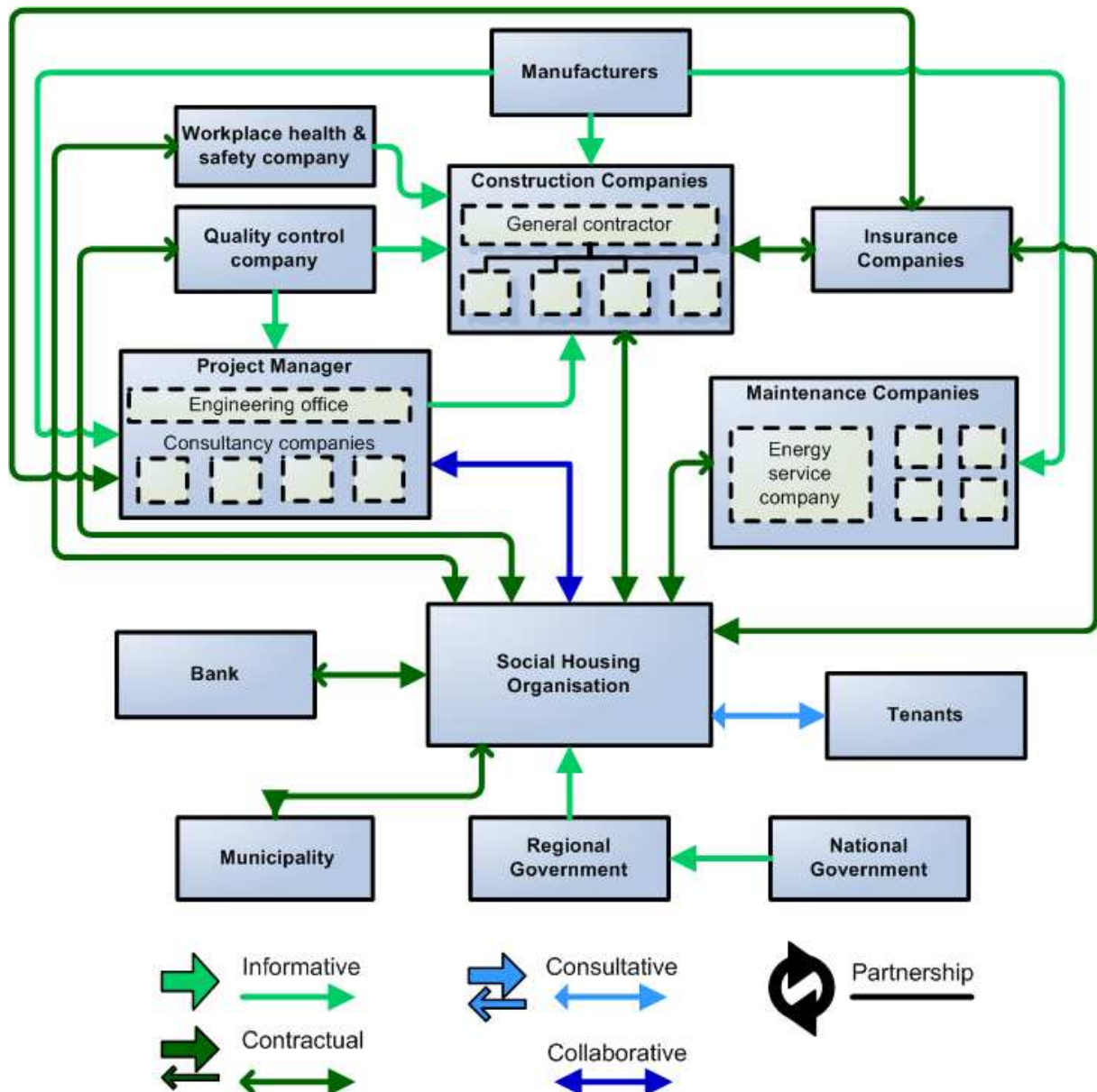
1 Reminder of main conclusions from TU Delft study and targeted problems that the pilot project will try to overcome.

Logirep has used until this project conventional coordination models, as Design-Bid-Build or Iterative Minor Renovation, meaning first tendering the design, then the construction, and finally maintenance. The main problem faced by Logirep was a lack of coordination and responsibilities, the maintenance company arguing that the reason for the lack of performance was due to a default in the construction, or the construction company facing an execution problem arguing that it is due to a design problem.

Besides, as the maintenance company comes to the project once the works are finished, the information about the systems to maintain is not sufficient to guarantee an optimal performance. This becomes an increased problem when facing relatively new technology for energy performance, that maintenance companies are not used to work with.

In the context of the Grenelle law, that requires that all high energy consuming buildings are renovated and consumption reduced to at least 150 kWh/m²/year, there is a need to improve the knowledge on the real (not theoretical) performance after renovation. Logirep past experiences show that it is difficult for us to monitor and follow in-house the performances after renovation. The Vitry experience is also an answer to this need.

The following figure, created by TU Delft in WP3, illustrates the current relationships between actors in “business as usual” renovations by Logirep.



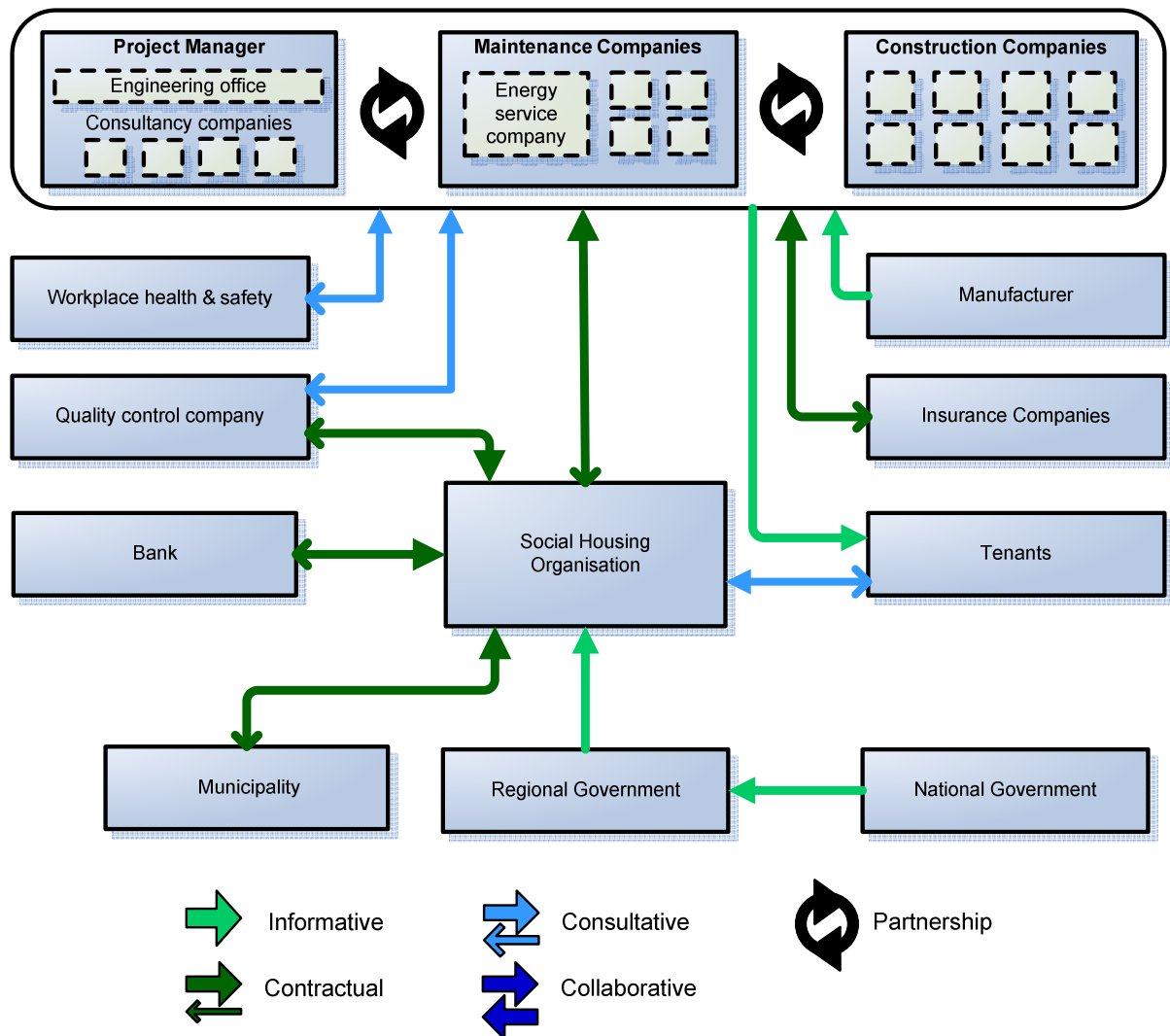
Integrated design is a solution for two reasons:

- The whole consortium is responsible for the final result. The guarantee is not a guarantee of means, but of results.
- The maintenance company is associated from the design phase to the discussions and it is in the interest of the whole consortium that all needed information is given for optimal operation configuration.

2 Analysis of the chosen alternatives (phase by phase)

As said previously, the Vitry project is the first experience in Logirep of integrated design.

Based on TU Delft previous figure, the following figure illustrates the new project organization:



The main difference compared to a traditional renovation project is the relationship between the architect, construction company and maintenance company: a partnership with share of risk is created between these actors, responsible for all the project phases, from design to maintenance.

Logirep has a contractual relation with the consortium that is rather collaborative, as a high degree of interaction is developed during the whole project. The construction company, in this case, is the representative of the consortium.

The Vitry project is currently at construction stage until March 2013. It is therefore difficult to have a consistent feedback of the experience at this stage in terms of final results. However, energy performance is guaranteed and maintenance of the building services ensured for 4 years.

Tendering phase

This phase was the most time-consuming. Logirep had to work in the definition of the program of requirements and the award criteria.

Besides, the analysis of the received bids was more complicated than usual, and it was necessary to ask for external expertise in order to have an objective analysis of the received offers. Logirep does not have a clear idea for the moment if an external expertise will always be needed to analyze the offers, or if the knowledge will be developed in-house. This, plus the compensations given to the bidders that were not selected, has led to an increase in the cost of the tendering procedure.

Logirep is satisfied with the award criteria that were chosen in the tendering procedure.

Five candidates answered to the offer. A month was needed to analyze the offers. All offers came from general contractors. No SMEs answered to the tender, due probably to the size of the project: it is difficult for an SME to guarantee the performance during 4 years in a project of this size.

Design phase

More actors are involved in the design phase: architect, engineering company, construction company, and to a certain extent maintenance company. Coordination meetings took place every month. This organization allows increased exchanges and brainstorming and thus a better result can be expected. The design-construction phase has particularly had an influence in the way the general contractor has worked. Every technical solution proposed supposed a number of simulations before validation, and the participation of the technical department of the general contractor, that usually does not participate at this phase. It seems that proposing changes to the initial project, such as changing the thickness of the external insulation for example, has been easier, as all partners work in a team, than in a standard project.

Besides, at the end of the design phase the General contractor has already defined the technical details of the works together with the architect and the SHO. There is no need to work on this during the construction phase, as all main decisions have already been taken and agreed.

The maintenance company was already in charge of the site before the works: during the design phase, the presence of the maintenance company was interesting to share the knowledge of the site.

Construction phase

Works are currently going on and are planned until March 2013. It is therefore not possible to have a feedback at this stage on the final result.

Some elements can however be underlined at this stage:

- The preparation of the worksite has been longer: it takes usually 2 months, here it has taken 4 months. However, as the worksite preparation can be done in parallel to the definition of the execution project, it results in a gain of time (hidden time).
- No time was lost in proposing technical changes and waiting for the SHO agreement: almost everything has been defined and agreed during the design phase. Therefore there is no time lost during the works and less administrative work.

In addition to this, Logirep notices that the construction company realizes more self-controlling tests of the energy works, which will likely result in an increase of the final quality of the works and of course is a guarantee of meeting the announced and guaranteed energy performance.

What can be said is that:

- Performance is guaranteed and Logirep is assured of the energy savings.
- The transition phases design/construction and construction/maintenance is managed by the consortium. Logirep can then be more focused on the final objectives: the service to the tenants and the reduction of the energy consumptions.
- There is less risk of delays during the construction phase, as most of technical decisions have already been taken previously.

5 Legal/technical expertise

Logirep has asked for a technical expertise for the writing of the program of requirements and the analysis of the bidders.

PART III CONCLUSIONS

1 Impact

Energy savings	Cost	Time	Quality of the works
40%: from 242 kWh/m ² /year to 141kWh/m ² /year (real consumption) and 62 kWh/m ² /year in theoretical consumption. Including this parameter in the award criteria has led to ambitious proposals from the bidders.	9M euros, 4M energy works.	Design phase longer, but it includes decisions that are usually taken during the construction phase. The architect estimates the design was done in half the time compared to a standard procedure. Worksite preparation was longer but done in hidden time. The decisions taken during the design phase guarantee less problems during the construction phase and decreases the risk of work delays.	Too early to determinate. Increased collaboration and self-control of the consortium.

2 Future possible improvements and replication

Critical mass

The integrated design experience, as well as the guarantee of performance cannot be implemented in all the building stock to be renovated at Logirep. Several conditions, particularly a critical number of dwellings, are necessary to attract contractors via energy savings potential. Logirep would like to implement integrated design with guarantee of performance in smaller projects. A possibility could be grouping of smaller projects, provided that the program of works are similar and the projects are geographically close. This reduces the number of projects where grouping could be a possibility.

Real energy consumption monitoring

The follow-up of energy consumption is mainly for the use of the consortium in order to monitor the performance that is guaranteed by the contract. Logirep finds monitoring all the dwellings as it is foreseen in Vitry is excessive and too expensive for the project. Monitoring 20% of the dwellings could be enough and it will be experienced in future projects.

Logirep would also like to go further in our next project and to develop smart metering in order to be able to have a more direct influence on the tenant energy behavior. This can be asked to the contracted consortium, but also a competence to be developed in-house in order to better communicate with the tenants on energy saving issues.

High energy performance ambitions

Finally, Logirep thinks integrated design is necessary in projects with high energy performance objectives. Reaching a nearly-zero performance after works needs a close cooperation between design and construction that can only be achieved with a single tender. Logirep will experience in 2013 a 70 dwellings building renovation to a passive standard using an integrated design procedure.

Annexes:

- PowerHouse template (Shelter customized)