www.suden.org/english/actions_projects/factor4.html

The Factor 4 project

for optimising retrofitting programmes for social housing towards a factor 4 within a sustainable development approach

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One of the optimisation objectives with the Factor 4 models is to help social owners in working out a long term retrofitting strategy for their whole building stock

Why a life cycle energy costing for building retrofitting and the social housing building stock management ?

Is going always to a factor 4 realistic for building retrofitting as regarding the expenses needed ?

Life cycle energy costing is a sustainable development approach because it is possible to analyse together energy saving, CO_2 emissions and their impacts as regarding the maintenance cost, charges for tenants, the net present value, energy prices evolution…

In the Factor 4 project, with the Factor 4 models worked out, we try to answer this important question (cf. del. 10).

The main interest of the Factor 4 models and of this sustainable development approach is to get for free, in few hours, together the energy and CO_2 labels as well as the best optimised scenario or retrofitting programme (with its needed technologies or equipments as well as their cost and the advantages for each type of actors: the social owner of course but also tenants and the whole society) for a building (and so, for a building stock as well as for a neighbourhood or a territory).

Reminder on the Factor 4 objectives and content

The Factor 4 project follows the Sustainable Development World Strategy worked out in Johannesburg in 2002 and deals with existing social housing buildings which will still be there in 2030-2050 for improving their energy efficiency by a minimum of 30 % in a short term and more in a long term and using renewable energy, in order to participate to the reduction of greenhouse effect gas (GEG) emission by a factor 4 before 2050.

The Factor 4 partners: SUDEN (coordinator, a non profit association whose aim is to gather researchers and practitioners towards a sustainable urban development)), Crdd La Calade (F), Cenergia (Dk), Ricerca & Progetto (I), Volkswohnung (D), Moulins Habitat (F), Soc Coop ABITA (I), KAB (DK), Union Sociale pour l'Habitat (F), Habitat et Territoires Conseil (F) and Association of Local Development Promotors (Ro).

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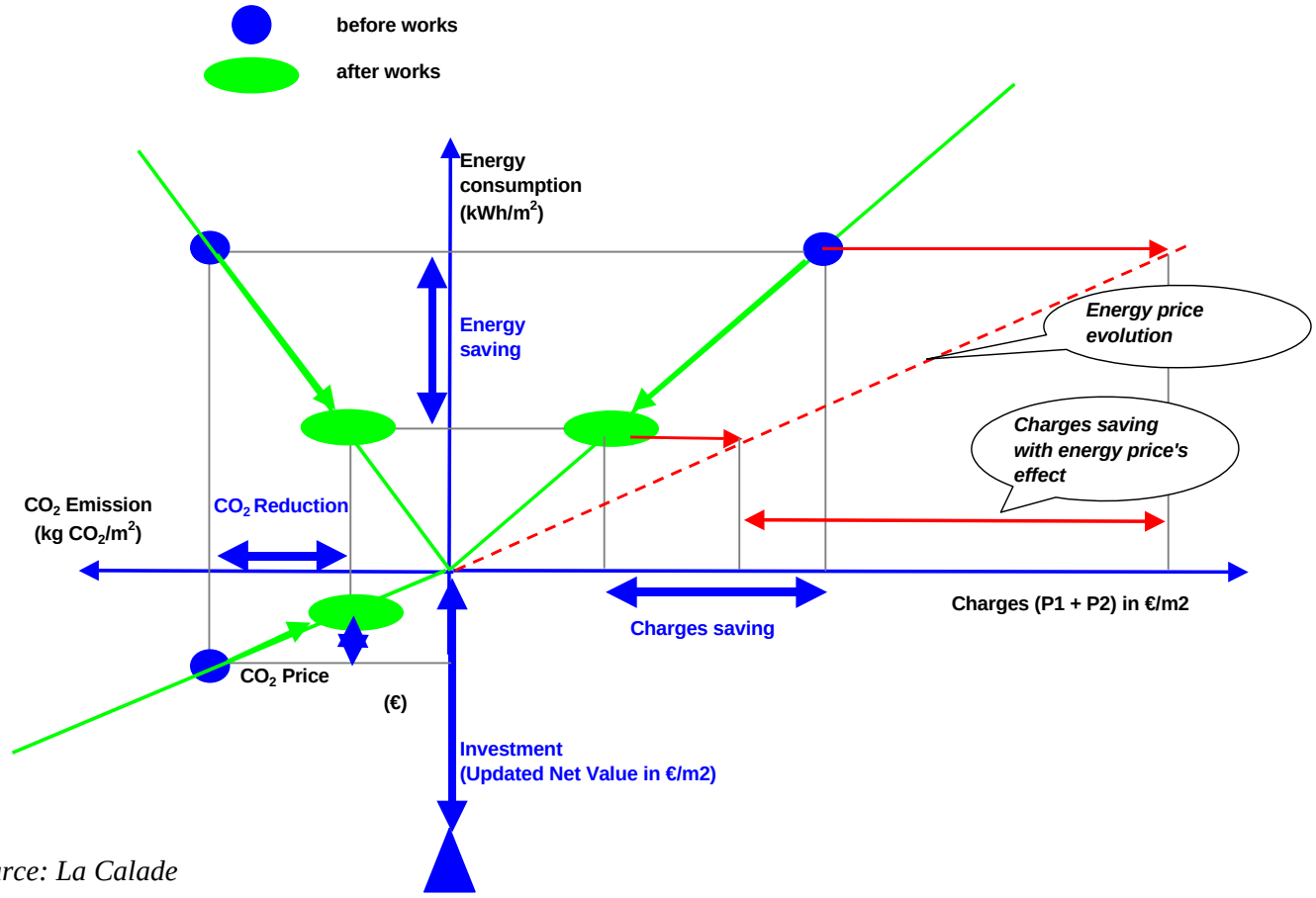
What is a life cycle energy cost analysis ?

The life cycle cost analysis with the Factor 4 models

The Factor 4 model or the life cycle energy costing allows to reach 3 optima <u>together</u>:

- Energy savings,
- CO_2 emissions,
- the Net Present Value or the pay back return of investments, the impacts upon charges (for tenants) and maintenance costs for social owners, including the increase of energy price

As shown in the schema below:



Source: La Calade

The interest of a LCEC approach

Reminder on the Life Cycle Cost approach (*Source: ISO 158686 and ISO 14040 and Final report of the Task Group 4 upon Life Cycle Costs in Construction, November 2005*)

The Life Cycle Cost (LCC) is the total cost of a building or its parts throughout its life, including the costs of planning design, acquisition, operations, maintenance and disposal, less any residual value.

The Life Cycle Costing (LCC) is thus the technique which enables comparative cost assessments to be made over a specified period of time, taking into account all relevant economic factors both in terms of initial capital costs and future operational costs.

The interests of a Life Cycle Energy Cost approach towards a factor 4 and sustainability

1. The economic analysis with a LCC analysis integrating externalities is necessary for an optimised investment's (especially in case of public funding)

The simulations have shown that it is necessary to set up a sustainable development approach and to think as usual in technical terms but also in economic terms for setting win – win energy policies (win for the users and win for the society) and that **the aim in retrofitting projects is not to reach absolutely a factor 4** and that a factor 3 can be sufficient in the present state of techniques and market (the construction of new buildings balancing the difference) as well as a factor 5 is sometimes possible.

This analysis has shown conversely that **a limited energy retrofitting** (a frequent practice nowadays in France for example) **with a GEG reduction of only 30% for example** (e.g. factor 1.4) **doesn't enable to reach the economic optimum.** Of course this effort towards the optimum is difficult because of the calculation rules for the level of the rents or because of the financial capacities of the social owners… but, in case of public financial support, it enables the best potential use of public funds.

2. Technologies choice

To reach a factor 4 requires also the development of some technologies, among them some are already on the market and others not yet. Some professionals have already understood it (cf. data base in the deliverable 6). **The Factor 4 models select to technologies and equipments needed in the optimised scenario and their cost.**

3. Household electricity consumption

Social owners never deal with the household electricity consumption, whereas the tenants' expenses for electricity are far to be insignificant. Electricity saving actions in residential units and common parts (which consumption could reach 2 to 12 kWh /m² of the living area) can reduce these expenses by more than 40%.

4. The importance of sustainable strategies for energy retrofitting of social housings both at a territorial scale and at the building stock level (further steps of the approach)

This analysis requires more precision in the definitions of retrofitting strategies at a territorial scale (neighbourhood regeneration projects or conurbation's strategies, or strategies at the county-region level) and at the social owner's building stock level, particularly through the taking into account of the buildings components lifespan or of the local context particularities (know how of the building companies for example).

The Factor 4 results available in September 2007

The Factor 4 deliverables available on the web site (now or in the next months):

- ***Del 3***: **Typological analysis and energy diagnosis for the "2050 buildings"**, Jean-Alain Meunier (HTC) for France, Ole Balslev-Olesen (Cenergia) for Denmark, Reinhard Jank (Volkswohnung) for Germany, Jana Suler (APDL) for Romania, with contribution from Philippe Outrequin (La Calade) and Julien Ciron (HTC) for France, Sergio Bottiglioni, Angelo Mingozzi (RicercaeProgetto) and Francesca Conti (ANCAb) for Italy, November 2006

- ***Del 4:*** **The typology of buildings which will still be in use in 2050, the estimation of greenhouse effect gas (GEG) emissions from the social housing building stock and the selection of criteria for choosing the cases studies**, P. Outrequin (La Calade) for France, O. Jansen (Cenergia) for Denmark, R. Fabbri (Abita), S. Bottiglioni and A. Mingozzi (ReP) for Italy, R. Jank (Volkswohnung) for Germany and J. Suler (APDL) for Romania, 03/07

in French (about France only): **Typologie des bâtiments qui seront encore en usage en 2050 en France, estimation des émissions de gaz à effet de serre du parc social et critères de sélection des études de cas**, P. Outrequin (La Calade) and C. Charlot-Valdieu (SUDEN), 12-2006

- ***Del 5*****: A life cycle energy costing model for optimising retrofitting programmes of existing social housings towards a factor 4,** O. Balslev-Olesen (Cenergia, DK), S. Bottiglioni, A. Mingozzi (ReP, I), P. Outrequin (La Calade, F), C. Charlot-Valdieu (SUDEN, F), J. Suler (APDL, Ro) and R. Jank (Volkswohnung, D), August 2007

- ***Del 6*****: Energy Efficient Technologies in Europe**, S. Bottiglione (R & P, I), P. Outrequin (La Calade, F), O. Balsev-Olesen (Cenergia, DK), J-A Meunier (HTC, F), C. Charlot-Valdieu (SUDEN, F), R. Jank (Volkswohnung, D) and J. Suler (APDL,Ro), July 2007

- ***Del 7*****: Potential energy savings through a life cycle costing analysis in the Factor 4 building cases studies**, O. Balsev-Olesen (Cenergia, DK), P. Outrequin (La Calade, F), S. Bottiglioni and A. Mingozzi (ReP, I), C. Charlot-Valdieu (SUDEN, F), R. Jank (Volkswohnung, D) and J. Suler (APDL, Ro), August 2007

- ***Del 8*** upon the 3 national Factor 4 models in national languages (Danish, French and Italian)

- ***Del 9*** upon the cases studies analyses in national languages (Danish, French and Italian)

- ***Del 10*****: Elements for strategies for social housing energy retrofitting towards a factor 4 at territorial scales (from the neighbourhood to national ones) and for building stocks,** December 2007

- ***Del 11***: **Barriers analysis for social housings energy retrofitting towards a factor 4,** December 2007

-***Del 14***: **Best strategies or policies in social housing retrofitting in Europe**

At least a final Factor 4 Brochure will provide an overall synthesis of the Factor 4 results and will be available in various languages.