Energy efficiency in dwellings: it works!

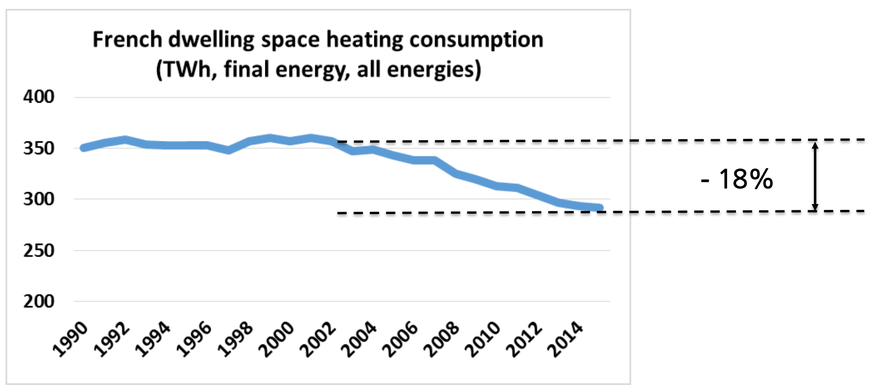
Retrofitting represents ¾ of the 2006-2013 decrease in French dwellings space heating consumption

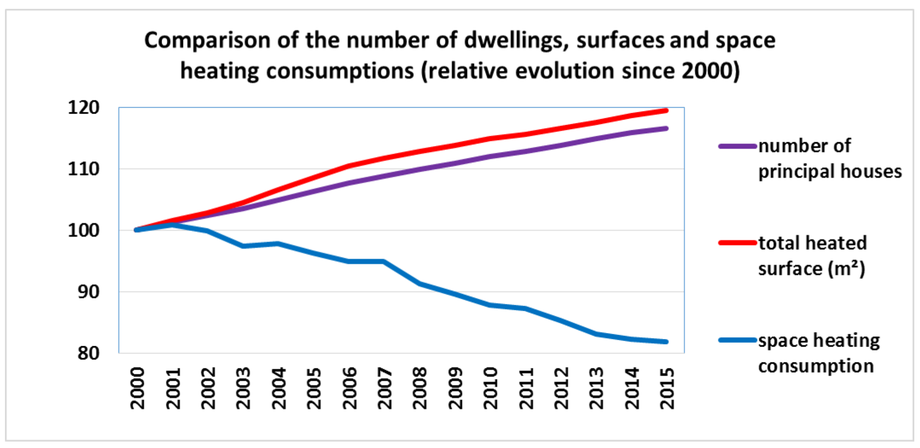
CONTEXT

In European countries space heating still represents the most important part of the energy consumption and bills in dwellings (for France, respectively 66% and 55% by 2012, source: CEREN 2014 and EDF-CIRED 2012).

After a long flat period, space heating consumption in French dwellings continuously decreased since 2000 (-18% between 2000 and 2015). Over the same period the number of dwellings (principal residences) increased by 14% and heated surfaces of the residential sector increased by 16%. The same statement was made in other European countries (e.g.: UK).

The question is whether this decrease is due to changes in behaviour (less comfort) or to the improvement of the energy efficiency of envelopes and space heating equipments (refurbishment of existing dwellings).





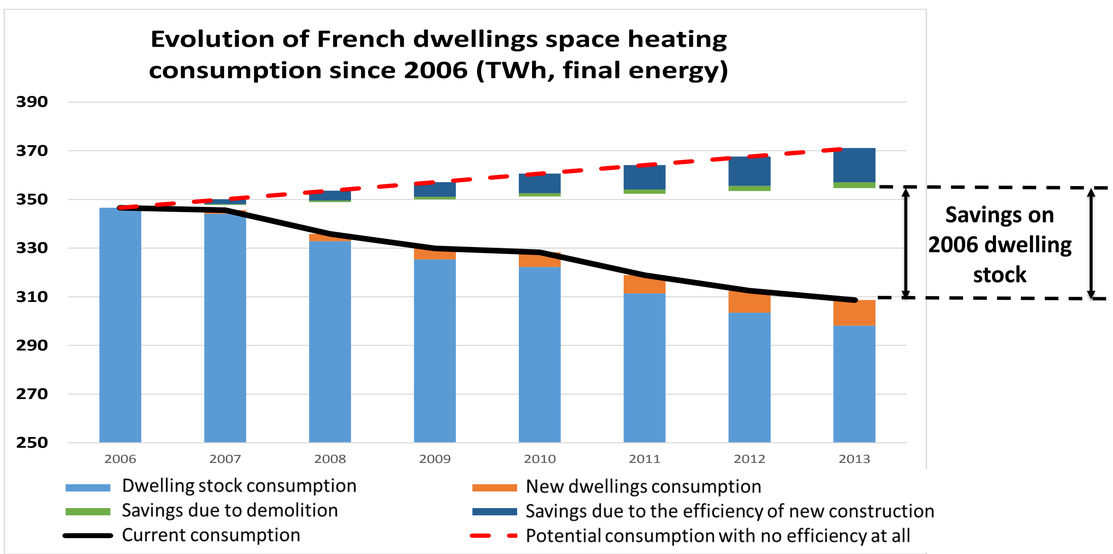
A BOTTOM-UP AND EXPLICIT METHOD

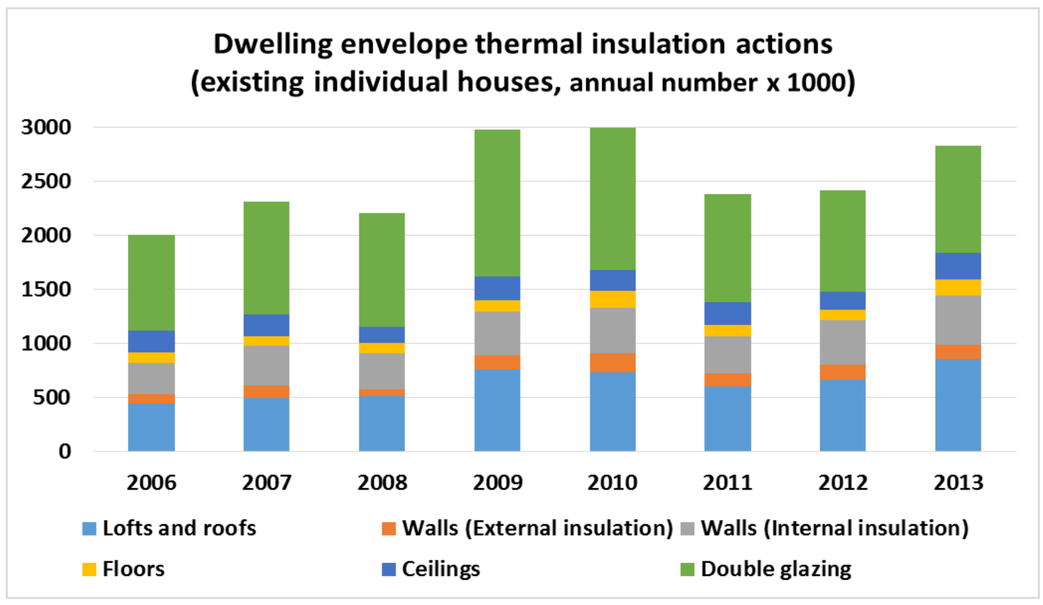
We have calculated the realistic impact of the observed number of refurbishment actions in the dwelling stock between 2006 and 2013.

Two kinds of actions have been considered: the thermal insulation of the existing dwelling envelopes and the renewal of space heating equipments (boilers, electric heaters, stoves,….).

The pace of increase in energy efficiency depends on the number of refurbishment actions, the type of considered dwellings (category, age?), the type of actions (for insulation: which part of the envelope, for space heating equipment: which energy?) and the "deepness" of refurbishment (very efficient or light?).

Surveys stating the number and details of retrofitting actions (TNS, PHEBUS, ENL) are available only since 2006. Consequently, the analysis have been conducted on the dwelling stock between 2006 and 2013.



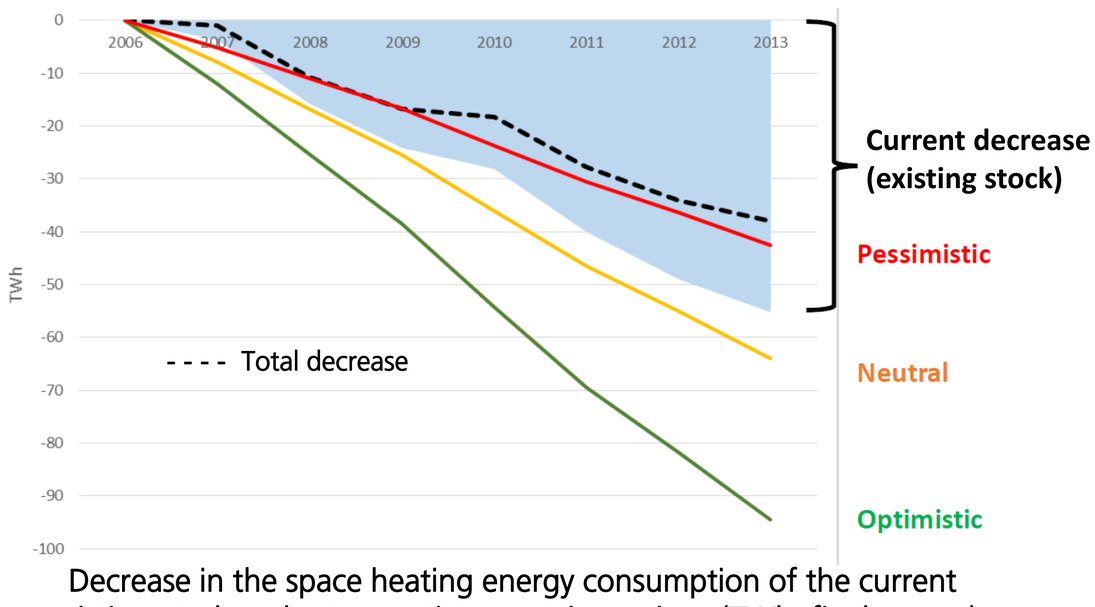


4.8 MILLIONS RETROFITTING ACTIONS/YEAR: THREE SCENARIOS

During the period 2006-2013, the current flow of thermal insulation actions on existing dwellings was 3.66 millions/year (75% for individual houses). During the same period, more than 1.1 million of space heating equipments were replaced.

Globally, almost 4.8 million actions have been conducted per year and 3 million of existing dwellings have been annually refurbished (with an average of 1.6 actions per dwelling).

For each action and each kind of dwelling (age, type, space heating energy), three scenarios of unitary savings per action and per dwelling (based on combinations of different actions) have been evaluated: "optimistic" (theoretical savings based on normative assumptions of the French "White Certificates" scheme); "neutral" (average value of existing French studies); "pessimistic" (lowest value of existing studies). Only neutral and pessimistic scenarios are considered as realistic ones.



Decrease in the space heating energy consumption of the current existing stock and retrospective scenarios savings (TWh, final energy)

THE PESSIMISTIC SCENARIO « EXPLAINS » 77% OF THE CURRENT DECREASE

The two realistic scenarios are close to current values. The pessimistic scenario is the only one giving lower savings than the observed decrease. The neutral one is the closest to reality but it overestimates the decrease by 16%, giving no place for the potential impact of behavioural changes. The results confirm that the optimistic scenario is unrealistic, as it states savings 71% higher than the observed decrease.

These results reinforce the hypothesis that the decline in space heating consumptions in existing dwellings is mainly due to the retrofitting of the building stock. A minor part should be attributed to behavioural changes.

The 2013 French National Housing survey (Enquête Nationale Logement) is available since the beginning of 2017. Future analysis of the 2006 and 2013 editions will give precious information on the evolution of the households' behaviour during the same period and will validate (or not) our assumption that "energy behaviour" has a minor impact on the decrease of space heating consumption.

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