

From sustainable housing sciences to sustainable housing policies: Challenging the social responsibility of researchers and designers

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Abstract

Whereas knowledge on sustainable housing techniques expands more and more, it can be noticed that the widespread introduction of sustainable construction techniques in a typical market situation often fails to happen.

Considering that, for example, the Kyoto protocol targets are just a first step in fighting the consequences of the greenhouse effect, one should principally expect the reverse to happen.

We distinguish three factors that contribute to this anomaly between 'knowing' and 'acting':

- the present higher investment costs of sustainable construction
- the difficulty of introducing awareness and attitude change with the larger public
- the inertia of policy makers in enforcing effective environmental measures that interfere with the public's everyday life, in this case in the domain of housing.

This raises some interesting questions for the scientific community:

- should researchers only 'inform on demand' or should they take the opportunities for a more pro-active attitude towards public, professionals and policy makers, while at the same time maintaining their scientific objectivity? Or, more fundamentally, does knowledge induce an ethic component one should not deny?
- can one think of promoting design strategies that provide for a multi-stage introduction of sustainable building methods, thus reducing the actual gap between goals and reality?

These questions are being addressed taking the context of Flanders, one of Belgium's three regions, as a starting point.

1 Introduction: a status quaestionis for Flanders, one of Belgium's three regions

In the past few years the concept of sustainability has become present in many spheres of our life. Sustainability features in the public debate, in the media, in politics and in advertising. Considering the consumption of the households, we notice a myriad of sustainability-related factors that are

interfered with directly by regulations, by the industry, by commerce and advertisement. There has emerged, by consequence, a general climate of mind setting that may give us the impression we are indeed becoming more sustainable consumers.

But is this the case? How much is common perception of sustainability-related issues referring to more sustainable realities? If one looks more critically at some facts, it becomes obvious that there is a gap between what we could understand from the mainstream discourse as being 'sustainable', and what really happens.

Only numbers can tell us the truth on factual sustainable development. We will therefore consider some general environmental figures for Flanders from 1990 on in the large field of housing, i.e. housing construction and subsequent household consumption.

1.1 Housing as part of the construction industry

In order to provide an idea of the evolution in the housing construction sector, we refer to general numbers for the construction industry [1]. However, we may assume that what holds for the building industry as a whole, applies fairly well to housing construction as well. There are indeed not so many fundamental differences in production process for residential and non-residential buildings in Flanders. But we do need to be cautious for numbers that are specifically influenced by infrastructure works (mainly road building).

Here are some statistics for the period 1990-2003:

- The Flemish construction sector produces far more waste than any other industry. The waste volume in tons augments from 2.67 million tons in 1992 to 6.8 million tons in 2002. That means more than a doubling in one decade.
- For CO₂-production, the construction sector is considered with the 'rest-activities' as Flemish chemical and metal industries produce the major fractions. CO₂-production from the so-called rest-activities augments from 2.5 Mton in 1990 to 2.7 Mton in 2003.
- There is, however, a drastic reduction in emission of CO, SO_x, NO_x and PAH's.
- Emission of volatile organic compounds in Flanders reduces by 50% in 1990-2003, but if one looks at specific sectors like industrial paint use in the construction sector, than we see an increase of 20-30% over the same period.
- Dust emissions remain constant in Flanders in 1995-2003. However, all industries taken together produce 50% less dust. By contrast, specific emissions for the construction sector rise by 5-10%.
- Energy consumption for the construction activity is again considered with the rest-group. From 1990 to 2003 there is a rise of nearly 40% in energy use for this group as a whole.

1.2 Eco-efficiency of the households

For the period 1990-2003 statistic information is as follows:

- Water consumption remains more or less constant at 110 l/person, day;
- Energy consumption rises with 20%, but fluctuates a lot. This is explained by the very large portion of energy destined to the warming of houses: 70 to 80%. The use of electricity rises with a 40%;
- The emission of greenhouse gases from the residential sector increases by 15-20%. The residential sector produces about one fifth of all CO₂;
- The surface of the territory occupied for housing increases by 27%. Thereby single family detached houses remain the 'best standard' for the market.
- Chemical oxygen demand reduces by 36%;

- Total household waste rises by 40%; however the rest-fraction reduces by 50%. Since 1999 a trend rupture can be noticed since population still increases but total waste production reduces. Over about the same period (1990-2000) buying power increases by 25%. Population increases by 4% from 1990 to 2003, while the number of households augments by 12% (reduction of family size).

We can also consider the energy consumption per inhabitant in a European context. This gives the following numbers (GJ/inhabitant, year) as for comparison (Eurostat):

Table 1: energy consumption per inhabitant in selected European countries

Country	GJ/inhabitant, year
Portugal	11,6
Netherlands	27,4
EU-15 (average)	28,1
Flanders	40,4
Finland	42,6

We notice that in the Netherlands, a neighboring country with a very comparable geography and climate, people consume just 68% of what an average Flemish uses. One of the major reasons for this contrasting situation is the simple fact that housing tradition in Flanders is based on a very extensive typology (single detached and fairly large family houses make up a considerable part of the housing stock) whereas the reverse is the case in the Netherlands. Finland, with a much colder climate, is at about the same energy consumption level as Flanders.

1.3 Conclusions for the present state of sustainable development regarding housing aspects

Taking all uncertainty factors into consideration, we can no doubt conclude that the situation of housing in Flanders, with respect to sustainable development, shows a clear tendency to *worsening* over the last decade.

If Belgium wants to reach its Kyoto engagements (which from a scientific point of view can be considered as a minimum effort), it should reduce its greenhouse gas production with 7,5% for the period 2008-2012, compared to the situation of 1990.

If the present tendency persists, this goal will never be reached – especially if we are looking at numbers for the construction industry and household consumption.

It would be absurd to expect other sectors such as industry or transport, to compensate in greenhouse reduction efforts by producing far better scores. The only way out would mean to massively buy emission rights from other countries, a practice that is doubtful from a lot of perspectives and principally objectionable, or to drastically change our housing practices.

2 Unsustainable development: why is it happening?

Numbers such as the MIRA-T indicators hardly receive any public attention in Flanders. There is, in the present conditions, obviously not a market for such a worrying message. But even in the case where people are informed, there remain obstacles to the introduction of sustainable practices. We discuss a few reasons for the present state of unsustainable development in housing matters.

2.1 Economical aspects

When we consider initial housing construction or renovation investment, we can notice that in about all cases the choice for a more sustainable building method is also the more expensive one.

Let us start with the best practice, i.e. passive standard construction. If one starts from a well-studied, integrated concept for a new passive house, the current expectation in Flanders is that, energy savings included, the passive house will remain some 10% more expensive than a house of classic conception, calculated over a mortgage period of 20-30 years [2]. Thereby, classic conception in Flanders stands for fairly bad isolation quality – see the huge figures for heating energy consumption.

For the renovation of an existing house, reaching the passive standard is even more discouraging since a lot of technical problems can only be overcome by expensive interventions, or even cannot be overcome at all (e.g. thermal bridges, ...).

As building/renovating expenses are often the biggest financial load a family ever faces, a minimum 10% budget increase is then of a problematic nature.

If we lower our standards, we can consider a group of interventions that do not correspond to passive housing, but still help to significantly reduce energy consumption. Economically speaking, these interventions will pay back over a certain time. An estimation for some of the most effective types of intervention in a typical Flemish house:

- Installing a high efficiency or condensation boiler for central heating: pay-back over 5-10 years;
- Isolation of roof in case of house renovation: 5-10 years;
- Replacing single glazing by super isolating glazing: 10 years;
- Installing a sun boiler: 10-20 years (even with subsidy);
- Energy-saving household equipment (European A-label): 5-10 years.

It is only after the pay-back period that the intervention becomes financially interesting – until the moment of replacement or reparation, e.g. of a boiler. Over the time of the pay-back period, the investor needs to pre-finance.

Even if a building client would opt for a sustainable construction method because he or she is convinced prices of materials and energy will drastically rise in the near future, the price tag is not encouraging.

At present, subsidies or tax advantages hardly cure this situation, for a number of reasons:

- They do not cover enough of the supplementary expenses;
- Belgium is a federal state with each of the authority levels having its own subsidy rules, resulting in a chaotic ‘subsidy market’ where people can hardly find their way. The Flemish government has even launched a website [3] to guide people through the process of selecting the appropriate subsidies. To that, one needs to add the changes in rules that occur permanently;
- Administrative procedures are complex and sometimes very slow;
- Tax advantages might have a perverse effect. E.g. at this moment one may receive a one-time tax cut for certain renovation investments, but pay a lifetime higher property tax because of the increased value of the real estate.

By conclusion, present economic and financial conditions generally do not stimulate people towards sustainable housing construction.

2.2 Political aspects

Closely linked to the economical aspects of sustainable construction, are the sustainability policies adopted at supranational level and by federal and regional governments. As the market usually does not correct itself for sustainability, appropriate governance can introduce such a correction.

Apart from imposing certain rules (e.g. the European directive on the energy performance of buildings, to become law in Belgium from 2006 on), a basic strategy to do so consists of consequently taxing what is not sustainable, and proportionally subsidizing what is sustainable. Thereby both efforts can keep each other in balance, resulting in a zero-operation for the concerned treasuries. This does not yet mean we have accounted of all the external, environmental costs that are presently not included in the economic price of (building) products and services, but we do initiate a correction mechanism in that sense.

If such a concept may be judged reasonably defensible, it is obvious that there is a major resistance in society to adopt it in an effective way, e.g. to fulfill Kyoto engagements.

Politicians will currently not incline to the full adoption of such a scheme for different reasons. Not only could they fear the effects of unpopular measures, but taking such measures in a global economy when others do not, would amount to political and economical suicide.

This means that even progressive politicians have a rather narrow maneuvering space for introducing sustainability changes into the socio-economic system, unless that system would adopt fundamentally different core values.

However, when we consider the present situation of Flanders from a European perspective, we notice that there should be more political margin than in other countries since Flanders has to cover up a lot in environmental matters before to arrive in the European leading group. So there is a scarcely exploited but substantial potential for political action, defensible in the terms of the present European socio-economic discourse.

2.3 Public awareness and attitude

People living comfortably do not want to change that. If we consider the fact that Flanders is one of the wealthiest regions in the world, we can understand that people are not pressed to change their present way of life and its modus operandi. There is, apart from the alarming news about e.g. environmental pollution or climate change, no *inherent* motor for change. Even if, for example, it starts to become clear that public health in Flanders is suffering from the elevated pollution levels, hardly any serious measure is taken to introduce a trend rupture.

There are a further two mechanisms that tend to reinforce this status quo. First, people have become used to expect action for protecting the environment to come mainly from the industry, and not from a change in personal behavior such as consuming more consciously, using the car less frequently or constructing and using a house in a more sustainable way.

Second, commerce has found a persuasive technique, known as 'greenwash', to bind its consumers to their old consumption habits. Misleading or erroneous information should convince people that they can go on consuming as usual because the products they buy have become 'green'. This goes unpunished: there is yet no legal framework that protects the consumer against the effects of misleading greenwash. A good example in the sphere of construction is a promotion campaign from the Belgian cement industry which stresses the 'ecological nature' of concrete construction, amongst others claiming that it helps to reduce CO₂-emissions for heating or cooling by 50 % through its thermal capacity...

The result of all this is an unalarming level of consciousness about the environment, making people to choose the 'green action' they prefer most from a market of possibilities. As such, they will buy a car

that has received, justified or not, a green label, rather than turn to public transport or the bike for their daily trip to work.

3 The gap between knowing and acting

The assessment of the present state of sustainable practices in Flanders, in particular for housing, illustrates a more general gap between knowledge and action. Indeed, for anyone wanting to be informed, it is easy to obtain sufficient information about the reasons why more sustainable practices are desirable, and how this could be accomplished. Even if discussion within the scientific community goes on about the precise eco-efficiency of particular interventions, there are basic options about which there can be little doubt. But those options require changes in attitude, in policy and in the rules of the market.

From the previous brief analyses one can conclude that there are strong mechanisms that induce a 'business as usual' scenario for these three spheres of intervention. But if we consider the potential future damages that go with such a scenario (exhaustion of natural resources, pollution, climate change), the question remains why so little action is undertaken.

The only explanation one could reasonably give then for this phenomenon is what we would call 'comfort inertia'. The routines of a system that provides a certain acquired level of comfort will only be changed if that comfort is seriously undermined. More in particular, even if one knows this moment is coming, the inertia reflex makes that nothing is done unless it is (too) late. Fundamentally, we can consider this as a problem of human psychology. However, the fact that changing current affairs can only happen successfully within a global frame of mutual agreements (e.g. Kyoto treaty) creates a circumstance that makes a process of change infinitely more complex.

4 Is ethics an issue for the scientific community?

If we consider the anomaly between knowledge and action, i.e. comfort inertia, as a core element for a situation of prolonged 'unsustainable development', the question for scientists as specialists of knowledge remains then if they should try to interfere with the field of practice. In other words, does knowledge induce a responsibility for action? Or shall scientists only inform on demand? Shall they try themselves to live more sustainable or does this have nothing to do with sustainable knowledge engineering as a professional occupation?

This is not any more a scientific question, but an ethical matter. You may wish to give a sound scientific basis for accounting of ethical behavior, but yet this will not provide any basis for action. Knowledge is neutral, only its practical use is charged with value.

But even if the realm of action belongs to the heart of the scientist rather than to his head, we could still think of scientifically based strategies for maximum information impact on real world practices.

5 Enhancing the social value of knowledge in the case of sustainable housing: incremental change

Within present socio-economic conditions, the way information coming from the scientific community can have a certain impact is depending on a number of parameters. We distinguish some of them here. A first parameter is the degree of scientific certainty about the phenomena that can force us towards behavioral change. If evidence about the human impact on climate change or resource extinction is

growing, the impact of that information could become stronger because it can no more be questioned or neglected by decision makers.

A second parameter has to do with the communication channels the scientific community uses. If those remain isolated from the working sphere of policy makers, lobbies or pressure groups, the impact of scientific evidence will be under-effective. For example, if scientists make less efficiently use of the media than greenwashing advertisers, there may be a risk that too much erroneous information is reaching the public, influencing its choices accordingly.

A third parameter has to do with the causal relation between information and action. If the information deals with realistic action, that action could become more probable. This means in particular it is worth finding out what can be done for supporting incremental change, even if that would initially not be sufficient to reach certain scientifically-based development targets on a larger scale or on longer terms.

Taking housing as an example, we could try to find out how on a short term and by discrete actions, benefiting from political support, housing routines could be turned into more sustainable practices. Such changes could then rather rapidly prepare the way for more profound interventions, as a general upgrading of practice is taking place.

Such an attitude is opposed to what we know as 'eco-fundamentalism', but as it should encounter less main-stream opposition, it could be a tactic that finally leads to faster and better results. The challenge for scientists then is to provide adequate policy preparation work, in order to avoid situations such as the 'subsidy forest' syndrome we described earlier.

In other words, the question in Flanders is not if we know to build sustainable, but if we know to prepare the policies for turning that knowledge into effective practice. This means in particular there is a need for more interdisciplinary action among technology, economy and sociology specialists in order to formulate proper policy strategies.

6 Conclusion

A brief review of housing in Flanders during the last decade shows us that sustainable development is all but reality for the sector. This tendency is opposed to long term goals such as fixed in the Kyoto protocol.

Several factors contribute to a certain status quo in unsustainable practices. There is a global politico-economical context, but there is also 'comfort inertia' from the public.

The challenge today for the scientific community involved with sustainable knowledge engineering is to provide strategies to counter this tendency. That could be done by interdisciplinary work, providing politicians with the proper working tools for realistic future action.

Acknowledgements

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