Wind turbines in Brussels?

Cityscapes are quite the opposite of the vast open spaces sought for locating giant wind turbine masts. And yet the wind which blows through a city, or is caused by the buildings themselves, can also be put to use. But not in the same way as in the countryside. Technical evolution is necessary, along with the notion of 'building integrated'. A European study into urban wind turbines is underway, and Brussels is part of it.

In July 2009, Brussels-Environment published a study entitled 'Study into the use of the potential of wind turbines in the Brussels Capital Region'. Carried out by the CERAA (Centre for Research, Study and Action in Architecture), in collaboration with the ICEDD (Studies and Advice in Sustainable Development), and two services of the ULB, this far-reaching study finally threw up as many unanswered questions as answers to the question of the pertinence of producing wind turbine energy in a city.

These questions revolve firstly around the nuisance factor: there is little information available about the noise emissions of micro-turbines or about their aesthetical impact; nothing is known about their impact on urban small animal life; the risks have not been assessed; blades cracking and falling to the ground, ice formed on these blades falling, the machine breaking down, thunder, vibration within the buildings, work accidents during installation and maintenance…

Other more administrative questions remain obscure: a planning permit will be indispensable, as will, probably, an environmental permit too, but nothing specific to these wind turbines yet exists within the various procedures in force in Brussels.

Where the potential power to be generated is concerned, the figures are not impressive: for the Brussels-Capital Region, the large wind turbines (outside of built-up areas) could total 2.8 to 18 MW and the micro-turbines 3 to 15 MW. This is to be compared, in order to put it into context, with the 1000 MW of power from just one of the six nuclear reactors in the country. A number of recent minor accidents and failures (at Mariembourg, Charleroi…) prove that micro-turbine technology is still at the trial and error stage.The study concludes by recommending deeper studies into the various domains, starting with a study on winds, an obvious prerequisite for any wind turbine project.

Bob Starc (Amaay!), recently designated as wind turbine facilitator for the Brussels-Capital Region: "Within ten years wind turbine technology will be as much a part of the urban landscape as traffic lights".


doc. Amaay

Nicknamed without compassion 'The Lady Shave' by Londoners, the Strata Tower (London) is a 42-storey residential building with 408 apartments, completed in 2010. This building produces 8% of the energy it consumes thanks to three wind turbines on its roof.

Technology in its infancy

"This is a good study", comments Bob Starc, from the Amaay! study bureau, a spin-off from a consultancy bureau specialised in the impact of the work environment on company productivity. "It puts the finger on the fact that, technically, we still no very little about urban wind turbines: to draw a parallel, we are currently at the same stage as the Wright Brothers' first powered flight in 1903. Just 63 years came between this and the first flight by a Boeing 747. We are in the same situation with wind turbines – everything remains to be invented. At Amaay! we are convinced that within ten years wind turbine technology will be as much a part of the urban landscape as traffic lights. And they will even be integrated into building design, as photovoltaic panels are now. Positive energy buildings will soon be the rule and wind turbines one of the means of achieving this. Fed by a multitude of independent sources and managed by a smart grid, the city will be made up of energy-producing buildings".

A new wind turbine facilitator in Brussels

Following the publication of this report, 2010 was dedicated to a first study on the wind Brussels, limited to just the Manhattan Tower in the North District and to brainstorming sessions involving scientists, local authorities and architects, sociologists… The following year, 2011, saw the first work on drawing up a 'map of the winds' in Brussels, and the birth of two platforms: internet site Wincitybrussels and Urban wind HUB, with a network of partners meeting each year in order to update on Wincity. A facilitator was finally designated: the Amaay! bureau, charged with identifying potential urban sites through a call for projects and assistance with these projects. Six sites with different typologies will be selected. Certain of these have already been investigated: the Midi tower, the North Galaxy tower, the Coca-Cola building and the Port of Brussels in particular. Over the course of a year, wind measurements were scheduled to be carried out on the selected sites. According to the results, technology suited to each site was then to be defined in order for pilot projects to be set up in 2012. Following the results of these pilot projects, the Region will be able to draw up a strategy for the development of urban wind turbines.

A European network of urban wind

The Wincity project is Europe-wide in scale, and underway in Luxembourg, Lille, Antwerp and San Sebastian in particular. Those behind it believe that the wind is an energy source which is growing in Europe and that the urban wind turbine will become a reality. The first objective of Wincity is to establish a database at a European level, gathering as much information as possible on the behaviour of the wind in cities. Anemometers will be positioned in strategic locations and measurements taken for at least two years. The objective is both to obtain usable information and to help make the public aware – in a visible manner – of the potential for wind turbines in cities. In a second phase, Wincity will position 'pavilions', flexible and aesthetically-pleasing energy-producing structures in strategic locations within European cities. These will make the public aware of sustainable energy solutions and will also improve the immediate urban surroundings. This phase will be followed by an exhibition of equipment and of the results of the pilot projects. Information on www.wincitybrussels.com

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Wind effects

Certain urban wind turbines could make use of the 'wind effect' caused by the buildings. For cities in general and tall buildings in particular often lead to micro-climates and to wind effects, a recognised phenomenon for a long time.
This is explained as follows: because of the friction between the air and the ground, the wind often blows more slowly at ground level than higher up. High buildings, however, tend to deflect the wind downwards, towards areas normally protected from it. These ground level winds are unpleasant (cold) and sometimes dangerous for pedestrians, and the problem is becoming more widespread. This is one of the reasons Chicago is known as 'the windy city'. In Brussels, the phenomenon is virtually permanent at the foot of the 174 metre high Finance Tower opposite the Botanical Gardens. This type of effect is also to be observed at the corners of buildings, which is what gave the engineers the idea of integrating vertical wind turbines into the buildings at these points. (Photo 1)
The 'Venturi effect' which is characterised by local increases in wind speed, and thus an increase in the amount of air being moved, is also noticeable in the gaps between two buildings or in tunnels created within their structures to serve this purpose. Certain urban wind tunnel projects exploit this effect, such as the Bahrain WTC Building (photos 2 and 3).

4. An architectural sign of the integration of sustainable development into the post-oil era city: vertical wind turbines coated with photovoltaic cells which could be located in urban public areas.

5. The Strata Tower in London - a 42-storey residential building with 408 apartments - produces 8% of the energy it consumes thanks to three wind turbines on its roof.