Introduction to the environmental study of streetlighting as an energy-using product

Energy, mostly just electricity (power) using products have various environmental impacts. The most important one is usually due to the power consumption during their life; other impacts are due to their manufacturing and other manipulations with them until their material recycling.

Streetlighting is very special in its impacts. This is due to the fact that **the very purpose of outdoor lighting is to produce a pollutant: light**. Luminaires emit this pollutant to their surroundings, and the pollutant spreads quickly and far, up to two hundred kilometres from the sources of pollution considering its concentration close to the ground. Unlike other power-consuming products, lighting devices whose light can penetrate outdoors are to be judged primarily from the perspective of pollution (mainly of twilight and night environment) by light. This pollution, not much recognised even two decades ago, is ubiquitous and has transformed our civilisation and wildlife a lot already.

The EuP study of streetlighting at product and system level began without realising this peculiar property, treating streetlighting just like other power-consuming applications. Describing the current practice throughout the Union, the range of possible power consumptions for the same task (putting the required amount of light on the street), and some options to slow down the existing steady rise of power consumption for streetlighting (or even to reverse it). However, without the basic attitude that even if we need outdoor lighting, we have to be aware that we are polluting the environment by it, not much can be improved. The prevailing current attitude is "the more light the better", light is considered as a universal blessing. This is not an atmosphere in which the necessary trend could be started: pronounced and steady decline of power consumption for lighting. And stopping the existing growth of light pollution (see http://amper.ped.muni.cz/light/lp_what_is.htm) and reversing it into steady decline as well.

In those regions where light is considered as a pollutant, AND outdoor lighting is regulated by law (see http://amper.ped.muni.cz/light/EuP/legislation2.htm), "**the less light the better, provided it still suffices**" attitude is beginning to spread, and an advance in technology and huge power savings take place. The necessary lighting tasks (illuminating streets to provide good visibility whenever needed at night) are done much more cautiously, avoiding emissions into directions where they are not needed, and any over-lighting of the target surfaces. We can't avoid light pollution, because we need streetlighting in most streets, but we can much reduce it.

The awareness that man-made light is a major pollutant of our night environment and that pollution should be minimised is the main motor of the changes of existing lighting systems. Power and money savings result from those changes, but as a motor for changes they would not be enough. Of course, some good examples can be found even in sites where light pollution is no widespread term, but this is solely thanks to the expertise and enthusiasm of individual (and rare) personalities. Most other examples in regions where lighting is not considered as polluting are very bad. Lighting does not serve its purpose well, due to glare, and is perceived as obtrusive by a significant fraction of the population (up to one half), and its running costs are much higher. Bad quality of lighting is erroneously "solved" by adding still more light.

An environmental-minded study of streetlighting should start from the notion that light is a pollutant and as such it should be applied just in the necessary amounts, directions and times. The present study has been but partly adapted to this view, at a late stage and not as much as would be needed, due to lack of time (e.g., the very metrics proper to evaluation of luminaires have been summarised just in January, see http://amper.ped.muni.cz/light/EuP/lp_fixt_par.pdf, technology of least polluting and most efficent luminaires has been described in http://amper.ped.muni.cz/light/EuP/FS.pdf). Implementing this view from the very beginning could have produced a more useful document. Of course, it would demand cooperation of experts at this field, which are very rare outside Italy at best. Let's hope even the present text will prove a good aid for future efforts to make streetlighting far less polluting (in all senses) and far more comfortable for its users.