Endocrine Disrupting Compounds (EDCs) interfere with the endocrine system leading to adverse health effects (e.g. diabetes, obesity, fertility problems, genital deformations, hormonal cancers, etc.). The prevalence of these diseases is globally increasing, and action should be taken to limit the exposure to EDCs. Not only humans, but also wildlife is suffering from these compounds leading to a decline in their population. EDCs are active at very small doses, even below generally assumed safe levels. Mixture effects, where the combined effect of substances can be greater than the sum of the effects separately, are currently not taken into account. An extra obstacle is that many EDCs are still unknown and even if they are expected to interfere with the hormonal system the legislation is running behind the facts.

This PhD research focused on different important exposure routes and successfully characterized, validated and implemented the ERE-CALUX bioassay. This technique measures unknown estrogenic compounds, as well as mixture effects, in an overall endocrine activity. In indoor dust from kindergartens, a main exposure route for young children, a clear relation was seen between the estrogenic activities and the presence of certain known EDCs. Additionally, some prevention guidelines were setup to minimize the intake of estrogens through indoor dust. Water and sediments of the Zenne, an extremely urbanized river, revealed a potential source of estrogen compounds and natural bacterial communities are able to break down some of the active compounds. For adults, food is a very important exposure route, where food packaging and food contact materials can be relevant sources. Investigation of paperboard shows that recycled fibers have a higher potential in leaking EDCs to food than packaging with virgin (not-recycled) fibers. Finally, plastic baby bottles were also studied where 29 of the 65 possible leaking compounds showing estrogenic activities.