Memo

To: ISVAG attention Director Kristel Moulaert

From: Professor Thomas H Christensen, member of the ISVAG External Advisory Board

Regarding: ISVAG's plans for a new Waste-to-Energy to be built in Antwerp, Belgium

5 September 2016

Statement regarding environmental issues

Information basis:

The specific information basis is:

- Nine memos prepared by RAMBOLL as provided by ISVAG regarding the new W-t-E plant
- A presentation of the main planning issues presented by Ole Petersen, RAMBOLL to the External Advisory Board on August 30th in Berlin, Germany.

General statement:

The project is well planned and realistic in terms of technical level. No matter which recycling initiatives may be introduced, there will in such a densely populated region be a need for an incineration plant. Consideration of needed capacity has been made and the technical capacity of the plant defined so that variations and changes in waste quantities as well as in calorific value can be accommodated. Although the thermal load is the critical factor, it is important that many tons are treated every year since this reduces the unit treatment cost.

In my point of view there are no technically well-proven alternative to waste incineration as long as the incinerator is planned and operated as part of an integrated waste management system with emphasis on material recycling and energy recovery. This means that the incinerator always must ensure optimal utilization of recovered energy and recovery of materials in the waste stream.

The comments below are some additional issues to consider in the continued planning of the plant.

Specific issue that could be considered:

The following issues could be considered for further elaboration as part of the continued planning work

- Quantification of environmental issues: ISVAG states that they want an environmentally friendly W-t-E plant, but the environmental aspects of the plant are not quantified in any of the available documents. This is apparently still in preparation. In this context it is important to remember that everything that the plant uses of materials and energy as well as the direct emission from the plant are by nature a load to the environment and that the environmental benefits come only from the value of the energy and materials recovered by the plant. The latter can be quantified by the environmental load saved by using the recovered energy and materials instead of producing these by traditional processes. This means that the environmental profile of the plant does not only depend on the technology installed and the way the plant is operated, but depends highly on how the recovered energy and materials are handled and used when leaving the W-t-E plant. To be environmentally r**es**ponsible in this context means that

the plant ensures that the recovered energy and materials are used in the best possible way, i.e. by substituting other production processes with a high environmental load. I suggest that the plant quantifies its environmental load. This will provide several insights: a) the plant is in some impact categories saving the environment (for example in terms of greenhouse gases and climate change), b) it reveals which part of the technology is critical from an environmental point of view, and c) it reveals where responsibilities should be exercised wrt the recovered energy and materials.

- Heat recovery: Heat is produced in the plant and can be recovered by different technologies. The amount of energy recovered is important (for example % of the lower calorific value of the waste), but rationale use of the heat is extremely critical. The key is the average annual utilization of the heat outside the plant, i.e. can the heat from the W-t-E be delivered to customers who then can avoid producing heat from fossil fuels. The use of heat in district heating is currently subject to a study, and actual markets for the heat not yet well identified. It is however important that a high level of heat utilization is sought. The actual uses of the heat can furthermore affect the design of the energy recovery system. In general, it has higher environmental benefits to produce electricity than producing heat, and since heat utilization often causes a decrease in the amount of electricity to be delivered to the grid, a thorough assessment should be made of the energy recovery system also paying attention to the environmental aspects.
- Metal recovery. Recovery of metals from the bottom ash, e.g. magnetic iron and aluminum, does provide significant environmental benefits and the bottom ash from the plant should be subject to metal recovery. It is not important from an environmental point of view where this recovery process takes place (within the facility or by outside contractor), but careful recovery of metals is recommendable. If the recovery is contracted, conditions and reporting must be carefully specified in order to exercise environmental responsibility.
- End-of-life of the new plant. The actual construction of the W-t-E plant is in itself an environmental load due to use of materials and energy. Recent data* suggest that this may be 3 % of C-footprint of the plant. The actual value will depend on how well the plant is designed for deconstruction and optimal recycling of the materials used in constructing the plant. This could be an issue to include in the specification of the technical features that demolition should be possible when the plant is abandoned.

*Quantifying capital goods for waste incineration, L.K. Brogaard , C. Riber, T.H. Christensen. Waste Management 33 (2013) 1390–1396