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Technical Sector Report on Data Models for Sensors

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Executive Summary

Based on the analysis in WP1 the importance of the potentially positive effects of sensor systems in the use phase of larger production lines in energy-intensive industries is confirmed.

The methodological approach focuses on a detailed scenario development for the use phase, and a much less detailed approach for modelling the sensor system itself.

The approach is meant to facilitate communication of likely benefits of applying a sensor system, and to calculate scenarios, which factor-in likely improvements related to better monitoring and control. Such an assessment will provide a sound basis to judge the usefulness of employing a sensor system. Six effects of better sensor-based process monitoring are covered by the methodology: Reduced downtimes, efficiency monitoring, higher machining speed, product quality, reduced yield losses, and optimized auxiliaries dosing. Those effects are evaluated by monitoring a change in the operating condition of the industrial process. The methodology paper outlines the approach to develop use scenarios for both, sensor use and conventional systems.

The Key Environmental Performance Indicators for the sensors sector are tackling energy, resources of the industrial process under control (depending on the actual resources consumed by the target process) and greenhouse gas emissions, and costs. All KEPIs will allow a thorough comparison of a scenario without (this) sensor-system and with the sensor system under study. Whereas greenhouse gas emissions will be covered on a cradle-to-grave basis, energy, resources and cost indicators will address the gate-to-gate perspective of the line operator[1].

The data model is largely based on data entries to be made by the user (sensor solution provider, who will need to request process specific data from his client) and thus has its strength as a well structured calculatory framework. For upstream data some datasets are the same as those required for other sectors (e.g. energy grid mixes), some are very application specific (addressing the industrial process) and cannot be provided for all thinkable industrial applications (leading to the requirement of an extendable database and linkages with others), and data for the sensor nodes will be based on the electronics tool of LCA to go.

[1] Cradle-to-grave: Full life cycle from resource extraction (cradle) to disposal phase (grave) [Guinee et al. 2001]; cradle-to-gate: Partial life cycle coverage from resource extraction (cradle) to the factory (gate); use and end of life phase are excluded from the assessment [Guinee et al. 2001]; Gate to Gate: use phase of the sensor system only