Predicting VOC emissions: an automated monitoring and feedback system for bioventing

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Soil remediation projects increasingly shifts towards monitoring and remediation techniques within a risk management approach. This approach fits into the actual attitude towards ecological and legislative issues such as the prevention of CO_2 emissions towards the atmosphere and decreasing the ecological footprint. Together with the ecological issues, economical concerns greatly determine the choices the remediator has to make. Ecological, legislative and economical interests of a soil remediation project are not necessarily contradicting each other and a carefully designed monitoring and feedback system is able to fulfill all three.

Designing and applying an automated monitoring and feedback system minimizing volatile organic compounds (VOC) emissions becomes possible when volatile organic compounds can be measured quantitatively in the soil gas. For this objective, a new integrated sensor is developed that monitors O_2, CO_2 and the concentration of VOCs in the soil gas phase. Because of its capacity to measure accurately in moist soils, this sensor offers a viable alternative for the PID-sensor.

The regulator only accepts a risk management based soil remediation approach when it can be guaranteed that no emissions occur during the remediation process. Furthermore, monitoring is needed to deliver proof of a successful remediation. At the same time, intensive monitoring results in the possibility of adjusting the remediation equipment more precisely to reduce energy requirements and the operational costs. The presented monitoring and feedback technique uses models combined with continuous on-line measured data using VOC-sensors and results in a continuously automated adjustment of the remediation process to prevent emissions.