

## **Development of a Sensor to Measure Hydrocarbons in Water (Hydrocarbex Project)**

Work Programme (Topic) 6.x...

Funding Scheme: Collaborative Project

The aim of this proposal is to develop a technical prototype of an infrared sensor that will measure hydrocarbons in water. The sensor will use a fibre-optic cable, coated with a polymer and the level of hydrocarbon will be determined by measuring the changes in refractive index. The key research challenges will be: assessing the use of infrared to measure the level of hydrocarbons in water, identifying a range of polymers that could be used in the sensor and finally assessing the accuracy of the sensor.

### **Background to the project:**

In 1999, the European Commission published legislation on water quality, known as the Water Framework Directive (COM 200/61). Annex 1 of this directive lists 11 parameters that must be continuously monitored to meet the directive. These are known as the 'priority hazardous substances'. One of these substances is Hydrocarbon. The sensors on the market today to monitor hydrocarbons in water are laboratory based, they require regular calibration and cost over €3,000 euro per sensor. If the water legislation is enforced it will cost the European water industry hundreds of millions of euro per annum just to measure this one parameter – hydrocarbons. The aim of this proposal is to develop a low cost, infrared based sensor that will measure hydrocarbons in water to meet the conditions of the directive. The sensor will be suitable for onsite monitoring, will require a minimum of calibration and will deliver data continuously.

### **Expected Results, Lead Users and Exploitation/Dissemination Plan,**

#### **A technical prototype of an infra-red sensor that will measure hydrocarbons in water:**

The sensor is expected to measure to an accuracy of 1,000 ppb (parts per billion) and will cost less than €50 to manufacture. A detailed design specification of the sensor will be published. This will enable design engineers to build and test prototypes of the sensor. The document will also be used in patent applications. A calibration curve for the sensor based on 150 hours of tests will be produced. This is essential to the product development engineers for further development of the commercial prototype and the reproduction of a range of test sensors for future pilot applications. The lead users will be design engineers in companies that design and manufacture sensors for the water industry. One of the partners (Capital Controls Ltd., UK) will define the industry requirements and will test the sensor in their laboratory and in a pilot test site on the river Severn, UK. The results will be disseminated to the water sensor industry through SWIG (Sensors in Water Industry Group).

#### **Factual Data to upgrade the Hydrocarbex Index (ISO TC147):**

The factual data will be used to upgrade ISO TC147 so that the standard can be used for infrared sensors. The Scientific Coordinator of the project is a member of the Technical Committee of ISO TC147. This will ensure an efficient transfer of the results from the project to the Technical Committee.

**Phases of Work:** 1. Review of sensors on the market, 2.Specification of infrared sensor, 3.Identification of polymer to coat fibre-optic cable, 4.Testing of sensor, 5.150 hours calibration test, 6.Dissemination of Results (SWIG), 7.Exploitation plan for further development.

**Partners:** The proposal writers have been active in the development of infrared sensors and one of the industrial partners is a company that specialises in the development of sensors for the water industry. Coordinator Dublin City University (Prof. Brian McCraith), Partner 2 (Role infrared sensors), Partner 3 (Water Sensor Company), Partner 4 (Fibre-Optic Company), Hyperion (Exploitation Manager), etc.

**Expected Budget:** €6,000,000

Framework 7 contribution (Maximum €3,000,000)

**Duration:** 36 months