Space Applications in support of Waste Management

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1. EU waste generation facts:
   a. Around 3 billion tonnes of waste per year in total (2010).
   b. Hazardous waste is estimated at 100 mTonnes per year.
   c. 38% of household waste is recycled (2008), with potential for up to 70%.

2. Business opportunity:
   a. Waste management currently represents 1.1% of EU’s GDP.
   b. Potential to create up to 500,000 new jobs.

3. Regulatory approach:
   a. Reduce environmental and health impact.
   b. Turn Europe into a “recycling society”.
   a. EU countries shall transmit statistical results on Waste Management to Eurostat every two years.
   b. Firms with less than 10 employees are excluded from any surveys.

   a. Establishment of a waste hierarchy.
   b. Polluter must pay the costs of waste management.
   c. 2020 targets for recycling waste: 50% household, 70% construction and demolition waste.
   d. Does not cover certain types of waste such as waste water, radioactive waste, decommissioned explosives ....
   a. Landfill sites are divided into three categories, according to the type of waste: hazardous, non-hazardous and inert: only treated waste can be landfilled.
   b. Levels of Biodegradable Municipal Waste sent to landfill must be no greater than 35% of the 1995 tonnage by 2016.
   c. Landfill facilities may not accept used tyres, or waste which is liquid, flammable, explosive or corrosive, or from hospitals and medical and veterinary practices.

4. Safe waste shipments (Regulation 1013/13/2006), within EU and with non-EU countries:
   a. Shall be done in an environmentally sound manner.
   b. Exports of waste to non-EU countries for disposal are prohibited. Imports of waste from non-EU countries for disposal or recovery are prohibited.
   c. EU countries shall implement inspection mechanisms, focusing particularly on the most problematic waste streams (e.g. hazardous, e-waste).
How much waste do we produce, and what type of waste?

In 2010, about 2500 million tonnes of waste was generated in the EU-28 and Norway (EEA, 2014)

Waste streams by source:
- Construction: 34%
- Mining and quarrying: 27%
- Manufacturing: 11%
- Households: 9%
- Energy supply: 3%
- Other sources: 18%

Waste streams by type of waste:
- Mineral waste: 43.5%
- Solid: 16.4%
- Household and similar waste: 7.4%
- Combustion waste: 6.0%
- Animal and vegetal waste: 4.4%
- Metallic waste: 3.9%
- Chemical and medical waste: 2.5%
- Wood waste: 2.5%
- Paper and cardboard waste: 2.3%
- Other waste: 12.2%

Sources: Eurostat 2010 data on EU-28 and Norway

Destination of Local Authority collected waste in England, 2000/1 – 2013/14

Landfill and Illegal Dumping

Priority Issues:
- Landfill pressures and impacts.
- Cessation legislation.
- Cost/tax burden.

Percentage of biodegradable municipal waste landfilled in 2006, 2009 and 2010 compared with the amount generated in 1995 — countries with derogation periods.

Typical charge (gate fee and landfill tax) for legal landfilling of non-hazardous municipal waste in EU Member States and regions (2014).

Waste Management IAP Workshop

• Workshop organised by ESA with Innovate UK’s Knowledge Transfer Network at ECSAT in Harwell on 19th January 2016.
• Aim of the Workshop was to gather insight into the processes of the Waste Management industry and to derive first hand User Requirements.
• The Workshop was attended by 30 experts from the Waste Management industry, advisers, Universities and the service industry.
• Very lively and creative atmosphere.
• Three Breakout Sessions were held after the general presentations covering the following topics:
  • Commercial / Industrial / Domestic waste.
  • Biomass / Anaerobic digestion.
  • Landfill and illegal dumping.

• Workshop Summary and all presentations can be found at:
  • https://artes-apps.esa.int/news/satellites-for-waste-management-user-workshop
Some of the key points raised by Users

• Early warning of waste fire from landfill sites important to help prevent a major incident.
• Burning of waste (legal or illegal) is difficult to control.
• User needs are not static, and the business case is difficult => Cost-cutting priorities vs Invest for future.
• Price volatility of raw materials is very important for the recycling industry => need for better resource mapping.
• Current lack of monitoring, e.g. boreholes and landfill gas, coastal erosion, and subsidence of legacy landfill sites which might cause leakage of hazardous waste.
• Municipal waste collection is often disruptive, with knock-on effects such as increased emissions due to congested traffic => need for improved logistics.
• Small illegal landfills are surprisingly widespread and can be quite large in extent, especially for high value waste, e.g. tyres.
Upcoming ITT on Waste Management

- Possibility to declare an “Expression of Interest” in ITT already in EMITS.
- The ITT will cover the following topics, though Bidders may propose others:
  - Logistics and recycling of commercial / industrial / domestic waste.
  - Biomass / anaerobic digestion and Greenhouse Gas emissions.
  - Landfill issues and illegal waste dumping.
- ITT is expected to be released in Q3, 2016.
Potential uses of Satellite data for Waste Management

**Satellite Navigation**
- Location information for monitoring transport of waste, or for localisation of in-situ sensors.
- Tracking and tracing of waste to ensure that it is channelled to an appropriate recycling facility.

**Earth Observation**
- Landfill management and monitoring, e.g. to identify possible locations for new waste disposal sites; subsidence monitoring to avoid leakages.
- Methane leakage and dispersion from landfill sites.
- Health of vegetation close to hazardous waste in order to detect possible soil contamination.
- Background atmospheric pollution levels for compliance monitoring of waste processing sites.
- Landfill heat / fire monitoring.

**Satellite Communications**
- Rural locations.
- Transmission of secure information.
- Large bandwidth.
Contact and Further Information

Thank-you for your attention!

- Tony Sephton: tony.sephton@esa.int

- ARTES Applications Website: http://artes-apps.esa.int/

- ARTES Applications Open Calls for co-funded activities on EMITS at: http://emits.esa.int (ITT AO6124, AO5891, AO5658)

- Information on ARTES Applications Opportunities at: http://artes-apps.esa.int/opportunities