Implementation of Industrial Symbiosis at Kujala

Waste is sorted and as much of the material as possible is recycled. The majority of recyclable waste is refined and used in the production of new material which can be utilised in industry. Organic material is used for biogas generation and in the composting plant. Raw biogas is produced from bio-waste, garden waste, and waste water sludge. This is then upgraded at the facility to produce high quality biogas which is transferred to the natural gas network. The remaining material is composted for use in agriculture and growing media.

Gas produced from waste which is deposited in landfill is reclaimed and most is pumped to a heating station where it is used to generate steam used in soft drinks manufacture. Remaining landfill gas is used to generate energy at the Kujala site. Leachate from the landfills and dirty water from other waste management processes and facilities is treated at Lahti Aqua Ltd’s Ali-Juhakkala waste water treatment facility.

Contaminated soil is stabilised and compacted into a non-toxic form at the Kujala site. It is utilised in embankments or as preliminary landfill cover.

Future Plans

PHJ’s 2020 strategy indicates that the primary goal is to increase the value added so that waste can be turned into saleable products and materials. PHJ has set a goal of achieving a 50% recycling rate of all municipal waste. PHJ also aims to increase the amount of bio-waste which is collected separately from general waste in a cost effective way.

In collaboration with the City of Lahti, PHJ is investigating sustainable solutions to optimise the potential of surplus land and brownfield sites. PHJ is also working towards powering the operations of the Kujala Waste Centre with on-site renewable energy generation. This goal has led to the installation of solar panels onto roofs in Kujala. The next planned step is to utilise the closed landfill surface as a solar park.
**Pécs-Kökény Waste Management Centre, Pécs, Hungary**

**Aims and Methodology**

The Pécs-Kökény Waste Management Centre was developed as part of Hungary’s Mecsek-Dráva Waste Management Project. This project was developed to solve the waste challenges of 313 municipalities and is supported by the European Union. The project required close cooperation across municipalities and a dynamic project team which included input from planning and waste management experts.

The project collaborated with the EU Technical Assistance Programme and secured funding from the EU Cohesion Fund. It also utilised municipal funds and ensured state backing. The key objectives of the project are to achieve compliance with the Waste Framework Directive (2008/98/EC), and the Landfill Directive (1999/31/EC), improve resource efficiency with regard to mixed residual waste and minimise diversion of waste to landfill, promote waste to energy conversion of non-recyclable material and minimise operational cost of waste management and therefore reduce public waste tariffs.

**Implementation of Industrial Symbiosis at Pécs-Kökény**

Recyclable materials are reclaimed and used to generate raw materials for re-sale. Passing through a mechanical-biological treatment plant, material suitable for fuel generation is separated and utilised as energy. Organic matter within the waste is also removed and is transferred to a composting facility to create a useful product.

**Future Plans**

Pécs has plans to extend the present manually operated sorting system in the materials recovery facility, and install a pre-sorting machine line to automatically pre-sort the waste. This will improve efficiency and will restrict hand sorting to fine sorting.

At the mechanical treatment facility, optical sorting machines will be installed at the end of the process line to improve the quality of the combustible waste fraction. This will reduce the chloride content of the end product as PVC plastic can be sorted out.

Further separation of bio-stabilised waste will be carried out to remove the 20-80 mm fraction which can be recovered for energy generation. To reduce waste sent to landfill, the amount entering landfill will be restricted to that which is below 20 mm fraction.

**Challenges and Learnings**

Challenges in implementing industrial symbiosis include managing close cooperation between governing bodies, stakeholders and the general public, and achieving public acceptance. Presenting plans and illustrating the social, environmental and economic benefits of a scheme clearly can help to overcome this issue. Good waste management strategies may take time and persistence to develop, and there is a need for good waste sorting efficiency at household and consumer level to ensure cost efficiency.

For the Kujala Waste Centre, obtaining environmental and construction permits, and reducing the volume of waste produced in the region were key challenges. Obtaining data on the sources and processing of industrial, agricultural and construction wastes was also challenging. Guidance, support and regulatory compliance and enforcement can help to overcome these barriers. The Pécs-Kökény Waste Management Centre found that the selection of technically and economically appropriate technologies required strong guidance and management from planning through to construction. The City of Pécs recommends that professional events and exhibitions are held to inform the project and source expertise. Engaging in knowledge transfer and participatory stakeholder engagement are recognised as key processes which cities should prioritise if they adopt industrial symbiosis.

**Key Benefits**

Some key benefits of industrial symbiosis are outlined below:

- **Impact Reduction**: Reduction of environmental impact of waste through recovery, reuse and recycling.
- **Biosaturation**: Biostabilisation reduces the environmental impacts and risks associated with wastes that are sent to landfill.
- **Creation of economic value from waste material**.
- **Reduction of GHG emissions** from waste transport and raw material extraction.
- **Reduction of reliance on fossil fuels** and decrease of emissions of NOx, SO2, CO2.
- **Extension of knowledge and practical know-how** of how waste management can be transformed into a sustainable and growth oriented business.