

# **RAEng VPs Case Studies**

**University of Surrey**

**Chemical and Process Engineering**

- Chemicals / Minerals Processing**
- Recovery / recycling / re-use**
- Dematerialisation**

**Charles Duff**

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# **Case Study 1: Water**

## **Industrial partner: BOC Gases**

- **Fresh water a finite resource**
- **A sewage treatment works**
- **Oxygen supply for the aerobic process -- air or oxygen?**
- **Balance energy requirements, capital, operating and transport costs, and process efficiency**
- **Make recommendation**

## **Case Study 2: Air**

**Industrial partner: [Env. Agency]**

- **Challenges to air quality: local, regional, international effects; regulations and conventions, health costs**
- **Abatement of NO<sub>x</sub> emissions from a nitric acid plant**
- **Selection of BPEO under IPC / IPPC: abatement materials, energies, wastes, efficiencies**

# **Case study 3: Waste and energy from waste**

**Industrial partner: Entec Ltd**

- **Waste and the waste hierarchy**
- **Legislation and MSW**
- **Disposal of sewage sludge: options**
- **Drying technology: energy and cost**
- **Extraction of energy from dried sludge: gasification or incineration**
- **Energy balances, envir. impacts**

# **Case study 4: Autocatalysts: costs and benefits**

**Indust'l partner: Johnson Matthey**

- **Urban air quality: tightening regulations**
- **Alternatives to catalytic converters**
- **Platinum Group Metals as catalysts**
- **Mining and refining**
- **Manufacture of autocatalysts; IPC & IPPC**
- **Recovery of PGM from spent converters**
- **Life cycle costs and benefits**

# Future Case Studies --

- **More illustrations of the generic issues**
  - Horticulture
  - Supply chain partnerships
  - By-product synergy

## **Other generic SD issues**

- Alternative energy
- International trade
- Social issues
- Integrated product policy

## **Delivery format --**

- **Lecture notes, hand-outs, illustrations**
- **Tutors' notes**
- **Discussion topics, project options, quantitative problems, multiple choices**
- **Site visits ? [Numbers, health & safety]**
- **Multi-media ?**

## **Assessment --**

- **Student questionnaires**