The Business of Food Waste

Dr Tom Dugmore
Waste Hierarchy

£80/ €100 per tonne
Breakfast
Spent Coffee Grounds

- 0.91 g wasted grounds per g of coffee produced
- 32,000 tonnes coffee consumed per year
- 29,000 tonnes spent coffee grounds per year
Coffee as a commodity

- 2nd most traded commodity after petroleum
- 8 million tonnes produced in 2011
## Oil Contents

<table>
<thead>
<tr>
<th>Source</th>
<th>Oil Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent Coffee Grounds</td>
<td>18.3%</td>
</tr>
<tr>
<td>Rapeseed and Palm</td>
<td>40%</td>
</tr>
<tr>
<td>Olives</td>
<td>10 – 30 %</td>
</tr>
<tr>
<td>Sunflower</td>
<td>22 – 36%</td>
</tr>
<tr>
<td>Soybean</td>
<td>20%</td>
</tr>
<tr>
<td>Cotton</td>
<td>20%</td>
</tr>
<tr>
<td>Corn</td>
<td>2.8%</td>
</tr>
<tr>
<td>Jatropha</td>
<td>25 – 40%</td>
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</tbody>
</table>
Oil Usage

- Cooking
  - Some oils inedible

- Biodiesel
  - Food vs fuel debate

- Soap and Cosmetics
  - Concerns over sustainability
Coffee oils for biodiesel and cosmetics

- **Biodiesel**
  - Meet all EN and ASTM criteria
  - More pleasing odour than used cooking oil

- **Cosmetics**
  - Similar fatty acid profile to palm oil
  - More sustainable
  - Source locally rather than import
Residual Grounds

- Composting
  - Extracting oils reduces acidity and concentrates other nutrients
- Biomass burning
- Fermentation
Commercial Value

- ~52p / L (before tax, delivery etc)
- 132.9 – 153.0 p / L (pump price)
- 136.0p 25/03/2014

- £9.50 / m³ (WRAP)

- Average 60 – 70 p / 100g
- Range 12.5p - £1.50 / 100g
Spent Coffee Grounds

- In 2013 –
  - 29,000 Tonnes SCG produced
  - £73 per tonne landfill tax
  - Cost of £2,117,826

- 5,000 Tonnes of oil for further use
- Potential pre-duty price of £2.6 million
- Potential pump price of £6.8 million
- Over £2 million potential tax revenue generated
Spent Coffee Grounds

Recycled coffee grounds are transformed by a patented process into our special fibers, which we call S.Café® fabric.

- FAST DRYING
- ODOR CONTROL
- UV-PROTECTION
- ENVIRONMENTALLY FRIENDLY

Coffee Biorefinery
OPEC

- Organization of the Petroleum Exporting Countries
- Orange Peel Exploitation Company
OPEC

Valorisation of a million ton scale pre-consumer waste to bio-chemicals, bio-materials and bio-fuels.

50% juice
50% waste

8,069,705 T/y of waste orange peels available in Brazil

- BIO-CHEMICALS: bio-solvents, natural fragrance chemicals, chemical intermediates, acid catalysts
- BIO-FUELS: sugars, chars, bio-ethanol
- BIO-MATERIALS: catalysis, separations, water purification
Pectin

- 20 – 30% of orange peel
D-Limonene

- Main component of essential oils
- Natural fragrances
- Strong apolar solvent
  - Replacement for, e.g. benzene, hexane
- Cleaning Products
- Anti-bacterial and anti-microbial properties
D-Limonene
OPEC project

- Developed in-house methods to extract pectin and d-limonene
- Microwave Technology
  - No harsh acids or solvents
- Industrial investment agreed to develop pilot-scale equipment
What can York do for you?

- Food Waste Producers
  - Find alternative uses for waste and unwanted by-products
  - Reduces landfill and other disposal costs
  - Potentially turn an unwanted waste stream into a new source of revenue
  - Network with companies that can make it happen for you
What can York do for you?

- Manufacturers
  - Help source new raw materials for your processes
    - Cheaper, safer, more secure
  - Safeguard supply chain
  - Address sustainability issues
What can York do for you?

- Processors
  - Reduce/recover energy costs
  - Increase customer base
What can York do for you?

- Industrial Engagement Facility
  - Meeting and seminar rooms for networking
  - Desk and lab space for visiting staff
  - Facilities to aid company start up
  - Access to additional funding and grants
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