Industrial Symbiosis for Systemic Eco-Innovation

Peter Laybourn – Chief Executive
International Synergies Ltd
Industrial Symbiosis
Fosters Systemic Eco-Innovation

- What is Industrial Symbiosis
- Who is doing it and why
- How are they doing it
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Industrial symbiosis: Tool for the circular economy

Success factors:
- Practitioners with industrial experience
  - Marry data & expert knowledge
  - Work with regulators, innovators
  - Long-term relationship building
- Engagement model
  - Extensive diverse network
  - Business opportunity programme
  - Demand-pull on innovation
- Data
  - Company-provided
  - Regulatory

Delivers:
- Eco-Innovation
- Novel ways of
  - Sourcing inputs
  - Non-product outputs
  - Business processes

OECD declares industrial symbiosis ‘a la NISP’ to be “an excellent example of systemic innovation vital for future green growth”
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Mainstream business seek solutions

“No company is looking for eco-technologies or eco-innovation. What they are looking for is a solution to a business problem”

Cesar Barahona, Nicaragua Cleaner Production Centre
[UNEP, Moving Ahead with Technologies for Eco-Innovation, 2014]

Mainstream businesses see resource efficiency as
• cost measure
• route to revenue diversification, and
• risk mitigation.
[Eurobarometer, 2012]
Eco-innovation in process

Recovering Precious Metals from X-Ray films

• **Challenge:** Change to X-ray films made existing process ineffective

• **Solution:** Engage with University innovation providers to change to process

• Parties involved: Betts Envirometal, University of Birmingham & International Synergies IS network

• CO2-eq reduction (24 kt)
• Eco-Innovation and Green Growth
• Materials security
• Regional Economic Development (11 jobs)
“Sustainability is your growth strategy, not separate from it.”
Prasad E. Menon, Chairman of Tata Group
[Global Green Growth Forum, Copenhagen, 2013]

A minority of businesses are motivated by
• competitive advantage and
• new business opportunities.
[Eurobarometer 2012]
Eco-innovation in products

Key stage for school dinners

• **Challenge**: food waste going to landfill
  Technical challenges: odour, storage, collection

• **Solution**: “Grott Box”, waterproof cardboard box with wax layer and snug lid, entirely biodegradable, used to collect food waste from schools

• 20,000 primary and 4,000 Secondary Schools = potentially 50-75,000 tonnes per year of food waste from these sources alone
Eco-innovation in business models

From dirty industry to clean energy company

- Animal renderer
- Initial NISP engagement: by-products diverted from landfill to cement industry
- Second stage: improve efficiency of processes
- Third stage: move into bio-fuels
- Fourth stage: anaerobic digestion and grid connection
- Result: new vision as energy company (same inputs!)
Pro-active Planning by Public Authorities for Economic Development & Inward Investment

- **Acids**
- **MSW**
- **Industrial plastics**
  - **Site 1**
    - Acids recovery
    - Pre-MRF
    - Plastics washing
    - Gasification
  - **Site 2**
    - Pyrolysis
    - Gasification
  - **Site 3**
    - WEEE repair & metals recovery
    - Technology incubator
    - Fuel cell recovery
  - **Site 4**
    - RDF/ERF
    - Drying facility

- **Recovered acids**
- **Clean plastics**
- **Non-recyclable plastics**
- **Char**
- **Bottom ash for metal recovery**
- **ASR/ash for metal recovery**
- **Bin bags**
- **Plastics manufacturer**
  - Closed loop bin bags for B’ham
  - Plastics innovation

- **WEEE**
- **Medical waste**
- **Fuel cells**
- **Repaired equipment**
- **Recovered metals**
- **Recovered acids**
- **Clean plastics**
- **Non-recyclable plastics**
- **Char**
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**Needs site with industrial buildings**
- AD with urban farming

**Recovered acids**

**Clean plastics**

**Non-recyclable plastics**

**Char**

**Bottom ash for metal recovery**

**ASR/ash for metal recovery**

**Bin bags**

**Plastics manufacturer**
  - Closed loop bin bags for B’ham
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**WEEE**

**Medical waste**

**Fuel cells**

**Repaired equipment**

**Recovered metals**

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**Bottom ash for metal recovery**

**ASR/ash for metal recovery**
Economic Drivers for Industrial Symbiosis in Europe

- Volatility of resource pricing
- McKinsey report, Resource Revolution
- 14 at risk critical raw materials identified by EU
- Rising awareness of sustainability issues (e.g. PlasticsEurope)
- Carbon Trading possibly to include Scope 3 emissions
European Commission promotes Industrial Symbiosis for eco-innovation, green growth

- Roadmap to a Resource Efficient Europe (2011) – exemplar
- DG Enterprise: Sustainable Industry – Going for Growth (2011) - exemplar
- Resource Efficiency (2011) – exemplar
- DG Regions: Connecting Smart and Sustainable Growth through Smart Specialisation – exemplar (2012)
- DG Environment: Priority for industrial policy in (2013) recommendation
- DG Enterprise: Communique on Green Entrepreneurship (2013)
- Commissioner Potočnik launches EUR-ISA (2013)
- Horizon 2020 (2014) includes industrial symbiosis to deliver circular economy
- European Resource Efficiency Platform key recommendation (2014)
- DG Innovation and Research: Short guide to assessing environmental impacts of research and innovation policy (2014)
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How Industrial Symbiosis Fosters Eco-Innovation

“Innovation occurs at the intersection of diversity, expertise and opportunity”
# NISP® (England) Delivered Outcomes: Economic, Environmental, Social

<table>
<thead>
<tr>
<th>METRICS</th>
<th>In Year Benefits*</th>
<th>Lifetime Impact (Max 5 year)</th>
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<tbody>
<tr>
<td>Landfill diversion</td>
<td>9 million tonnes</td>
<td>45 million tonnes</td>
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<tr>
<td>CO$_2$ reduction</td>
<td>8 million tonnes</td>
<td>39 million tonnes</td>
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<tr>
<td>Virgin material savings</td>
<td>12 million tonnes</td>
<td>58 million tonnes</td>
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<tr>
<td>Hazardous waste eliminated</td>
<td>0.4 million tonnes</td>
<td>2 million tonnes</td>
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<tr>
<td>Water savings</td>
<td>14 million tonnes</td>
<td>71 million tonnes</td>
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<tr>
<td>Cost savings</td>
<td>€243 million</td>
<td>€1.21 billion</td>
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<tr>
<td>Additional sales</td>
<td>€234 million</td>
<td>€1.71 billion</td>
</tr>
<tr>
<td>Jobs</td>
<td>10,000+</td>
<td></td>
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<tr>
<td>Private investment</td>
<td>€374 million</td>
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€40 million investment 2005-2012
*all outputs independently verified

Rate Euro £1 = €1.18
Takeaways

• **Who**: Industrial symbiosis gives rise to eco-innovation for leading and mainstream businesses alike

• **Why**: External drivers stimulate mainstream transformation

• **How**: Industrial symbiosis creates the space for systemic eco-innovation to thrive

Facilitated industrial symbiosis (NISP®) model is an excellent example of systemic eco-innovation. Replicated and moving toward scale.
Thank you for listening...

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