INDUSTRIAL SYMBIOSIS
Delivering Resource Efficiency and Green Growth

Peter Laybourn
Chief Executive
International Synergies Limited

G7 Alliance on Resource Efficiency – Industrial Symbiosis Workshop
29-30th October 2015, Birmingham, UK
"Striving to lead the world in innovative industrial ecology solutions for a low carbon, sustainable economy"
Industrial symbiosis delivers:

- Resource efficiency
- Demand-led innovation
- SME engagement
- Landfill diversion
- Water savings
- Carbon emissions reduction
- Virgin material savings
- Jobs
- Increased sales, reduced cost, profit and thus tax revenue
Industrial symbiosis addresses climate change mitigation (COP21)

<table>
<thead>
<tr>
<th>Input savings</th>
<th>Lower embedded energy in processing recycled materials than virgin raw materials</th>
</tr>
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<tbody>
<tr>
<td><strong>Process savings</strong></td>
<td>Savings in gas, electricity or other fuel use by one of the synergy partners principally through innovation</td>
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<tr>
<td><strong>Fuel substitution</strong></td>
<td>Replacing fossil fuels with other non fossil fuel sources in industrial processes</td>
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<tr>
<td><strong>Transport savings</strong></td>
<td>Reduction in transport directly associated with synergies</td>
</tr>
<tr>
<td><strong>Disposal savings</strong></td>
<td>Reduction in biodegradable material sent to landfill</td>
</tr>
<tr>
<td><strong>Energy Savings</strong></td>
<td>Production of energy through, for example, anaerobic digestion and utilisation of waste heat</td>
</tr>
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## Industrial symbiosis contributes to delivering Sustainable Development Goals

<table>
<thead>
<tr>
<th>SDG 8</th>
<th>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</th>
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<tbody>
<tr>
<td>SDG 9</td>
<td>Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation</td>
</tr>
<tr>
<td><strong>SDG 12</strong></td>
<td>Ensure sustainable consumption and production patterns</td>
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<tr>
<td>SDG 13</td>
<td>Take urgent action to combat climate change and its impacts</td>
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<tr>
<td><strong>SDG 17</strong></td>
<td>Strengthen the means of implementation and revitalise the global partnership for sustainable development</td>
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</table>
Engagement is at the Heart of NISP: Connecting Industry - Creating Opportunity
Opportunity Mapping
Thousands of Case Studies (Synergies)
## NISP® (England) Delivered Outcomes
April 2005 - March 2013

<table>
<thead>
<tr>
<th>METRICS</th>
<th>In Year Benefits*</th>
<th>Lifetime Impact (Max 5 year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill diversion</td>
<td>9.4 million tonnes</td>
<td>47 million tonnes</td>
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<tr>
<td>CO₂ reduction</td>
<td>8.4 million tonnes</td>
<td>42 million tonnes</td>
</tr>
<tr>
<td>Virgin material savings</td>
<td>12 million tonnes</td>
<td>60 million tonnes</td>
</tr>
<tr>
<td>Hazardous waste eliminated</td>
<td>0.4 million tonnes</td>
<td>2.1 million tonnes</td>
</tr>
<tr>
<td>Water savings</td>
<td>15 million tonnes</td>
<td>72 million tonnes</td>
</tr>
<tr>
<td>Cost savings</td>
<td>€243 million</td>
<td>€1.21 billion</td>
</tr>
<tr>
<td>Additional sales</td>
<td>€234 million</td>
<td>€1.17 billion</td>
</tr>
<tr>
<td>Jobs</td>
<td>10,000+</td>
<td></td>
</tr>
<tr>
<td>Private investment</td>
<td>€374 million</td>
<td></td>
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</tbody>
</table>

*All outputs independently verified

Rate of return for Govt. 9:1
Exchange rate £1 = €1.18

€43.4 million investment since 2005
Business Opportunity Workshop, South Africa

Gauteng Industrial Symbiosis Programme (GISP) Summary Report

GISP Business Opportunity Workshop
Riverside Resort – Vanderbijlpark
4 March 2015

During the day, 40 companies participated in a unique GISP synergy workshop. Over 223 resources were discussed and 590 potential synergies were captured.

Using the idea of Industrial Symbiosis, delegates identified beneficial innovative partnerships from under-utilised resources.

GISP would like thank all the speakers who gave insightful presentations. Special thanks to our stakeholders; The dti, DEA, GDARD, GDED and SGRIF.

What did companies think GISP could achieve?
- Boost sales 4.5/5
- Reduce costs 4.6/5
- Stimulate innovation 4.6/5
- Promote learning 4.4/5
- Reduce CO₂ emissions 4.5/5

What did companies think about the GISP workshop?
- Meeting their expectations 4.6/5
- Networking opportunities 4.6/5

What did they say?
“…This will be a fantastic opportunity to achieve numerous green economy objectives…”
- Karlien Erasmus
Promethium Carbon

“Think that IS can generate vast opportunities in my business and open other opportunities.”
- Deena Moodley
A J Polycycling

“What next?
Check your matches – Company report available within a week of workshop
- Progress discussions
- Contact GISP for support
- Stay in touch!
The GISP team will be in touch shortly to see how it’s going…

Get in touch with the GISP team!
012 841 2359 / 3413
gisp@csir.co.za
Facilitated Industrial Symbiosis a la NISP®: Circular Economy in Action

**Success factors:**

- Practitioners with industrial experience
- Engagement model (all sectors, all sizes)
- All resources: materials, energy, capacity, expertise, logistics
- Data

**Impacts:**

- Eco-Innovation
- Jobs, green growth
- Improved business processes
- Best practice sharing and cascading

Partnerships are key to maximise opportunities

- Regional Development Agencies (Local Enterprise Partnerships)
- Environment Agency/Ministry
- Universities as solution providers
- Knowledge Transfer Networks (Catapults)
- Govt. investment for facilitation
We’ve achieved:
NISP® (England) Economic Impact Assessment

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<tbody>
<tr>
<td><strong>Total investment</strong></td>
<td>£27 million</td>
</tr>
<tr>
<td><strong>over 5 years</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Economic Value Added</strong></td>
<td>£1.5 - £2.5 billion</td>
</tr>
<tr>
<td><strong>Direct receipts to</strong></td>
<td>£148 - £247 million</td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Benefit Cost Ratio</strong></td>
<td>32:1 to 53 :1</td>
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</table>

NISP Economic Valuation Report, by Manchester Economics 2009
We’ve achieved:
Global Recognition for International Synergies Ltd:

2015
Keynote speaker on the Circular Economy at the Global Green Business Summit, Mexico City in April

2014
Circular Economy Session, speaker, at GLOBE 2014

2013
Chief Executive awarded Edie.net’s Sustainability Leader of the Year Award

International Synergies organises a Public Private Partnership on industrial symbiosis for the Global Green Growth Forum (3GF)

Worldwatch Institute Europe, Best Practice Business Innovation in a Living Economy features NISP as exemplar

2010
NISP highlighted as 1 of 20 Worldwide Green Game Changing Innovations in a report commissioned by the World Wide Fund for Nature (WWF)

International Synergies received the Environmental Excellence Award for Best Carbon Reduction Programme for NISP

2010
OECD declares Industrial Symbiosis “a la NISP” an “excellent example of systemic innovation vital for future green growth”

2009
British Expertise International Award for implementing Industrial Symbiosis on a Global Scale
OECD declares industrial symbiosis ‘a la NISP’ to be “an excellent example of systemic innovation vital for future green growth.”

**Production Process**
- Pollution Control
- Cleaner Production
- Eco-efficiency
- Lifecycle Management
- Closed-loop Production
- Industrial Symbiosis

**Product & Service**
- Green products
- Eco-design
- New business models
- New modes of provision
- Mass application

**Organisational Boundary**
- Incremental Innovation
- Systemic Innovation
European Commission promotes industrial symbiosis for eco-innovation & green growth

• European **Waste** Framework Directive - Best Practice (2009)*
• Roadmap to a **Resource Efficient** Europe – exemplar (2011)*
• DG Regions: Connecting Smart and **Sustainable Growth** through Smart Specialisation – exemplar (2012)*
• DG Enterprise: Communique on Green **Entrepreneurship** (2013)
• European Resource Efficiency Platform key recommendation (2014)
• DG **Innovation and Research**: Short guide to assessing environmental impacts of research and innovation policy (2014) *
• Circular Economy Package (forthcoming 2015)

* Citing NISP ®

+ Turkey, South Africa and others
Circular Economy Business Models

Circular supplies
Resource recovery
Product life extension
Sharing platforms
Product as service

Accenture, 2014, Circular Advantage
Circular economy recommendations for industrial symbiosis:

- Accenture 2014 Circular Advantage
- Globescan 2015 [www.govsgocircular.com](http://www.govsgocircular.com)

Top 30 circular economy best practice examples for governments (two are industrial symbiosis examples)

Report co-authored by Accenture, De Groene Zaak, EY, IMSA and Royal Haskoning DHV

- FP7 POLFREE & DYNAMIX 2015 (Top 10)
- Manufacturing Commission 2015 Industrial Evolution
Steady stream of innovative applications

• Planning/regeneration
• Inward investment
• Involvement of public sector (participation)
• Knowledge transfer
• Construction and utilities (MIROG)
• Post-disaster/post-conflict situations
Industrial Symbiosis Opportunities: Attracting Inward Investment

- Paper Sludge & Ash
  - 2 partners
  - 4 partners
- Vermiculture
  - 12 partners
- Soil Conditioning
  - 7 partners
- Aggregate Production
  - 2 partners
- Paper Co
  - 1 partner
- Rejected Loads
  - 2 partners
- Water
  - 2 partners
- Incineration
  - 5 partners
- Construction
  - 5 partners
- Power
  - 1 partner
- Screening Materials
  - 4 partners
- Materials
  - 4 partners
- Waste Paper
  - 4 partners
- Plastics
  - 1 partner
- Organics
  - 4 partners

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Pro-active Planning for Economic Development & Regeneration (Birmingham)

Acids
MSW
Industrial plastics

Site 1
Recovered acids
Clean plastics
Non-recyclable plastics

Site 2
Char
Non-recyclable plastics

Site 3
Plastics manufacturer
WEEE
Medical waste
Fuel cells

Site 4
Bottom ash for metal recovery
ASR/ash for metal recovery

Site 5
Food waste

ASR
Paper sludge

ERF

Recovered acids
RDF

Bin bags

Recovered metals
Repaired equipment

Medical waste

Recovered acids

Food waste

Acids

MSW

Industrial plastics

Site 1
Concluding Remarks
Industrial symbiosis is..

• An excellent model to deliver resource efficiency
• Proven to deliver on eco-innovation and green growth
• Flexible tool to help deliver the circular economy
• New implementers can learn from our (global) experience

“Scaling up what works is the best strategy for green growth.”

Global Green Growth Forum (3GF)
Our challenge
What you can do ...

• Don’t need ... international treaties, new regulations, massive investment, proximity or trust, research or feasibility studies

• Do...!
  – Disseminate! ... Slovenia, Globe, 3GF, ISIE, ARSCP +???
  – Help developing economies to leapfrog
  – Use for SDGs, Intended Nationally Determined Contributions
  – Scale up what works – industrial symbiosis!

Please attend and contribute to ‘Next Steps’ 11.15 a.m. tomorrow
“The concept of industrial symbiosis is indispensable to the long-term development of global industry in all countries of the world. Developing economies around the world can achieve a more sustainable industrial development trajectory and move their economies towards a circular model more rapidly by taking advantage of the opportunities inherent in this approach.”
Thank you for listening...

Peter Laybourn  
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@NISPnetwork