
INDUSTRIAL SYMBIOSIS

Delivering Resource Efficiency and Green Growth

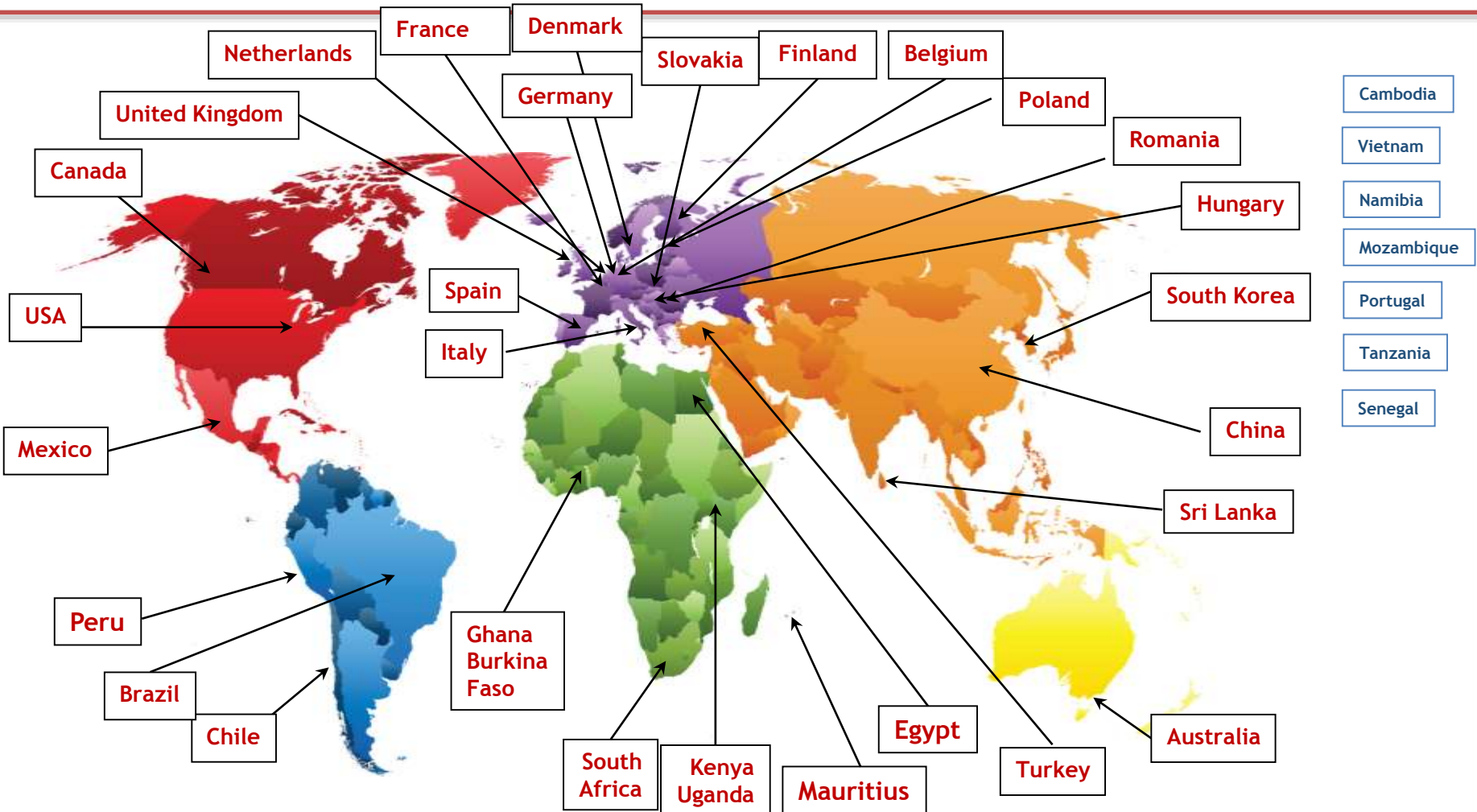
Peter Laybourn
Chief Executive

International Synergies Limited

G7 Alliance on Resource Efficiency – Industrial Symbiosis Workshop
29-30th October 2015, Birmingham, UK

International Synergies' Global Experience 2015

Expressions of Interest



Nov 2015

International Synergies Limited – Our Vision

"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)

Input savings	Lower embedded energy in processing recycled materials than virgin raw materials
Process savings	Savings in gas, electricity or other fuel use by one of the synergy partners principally through innovation
Fuel substitution	Replacing fossil fuels with other non fossil fuel sources in industrial processes
Transport savings	Reduction in transport directly associated with synergies
Disposal savings	Reduction in biodegradable material sent to landfill
Energy Savings	Production of energy through, for example, anaerobic digestion and utilisation of waste heat

Industrial symbiosis contributes to delivering Sustainable Development Goals

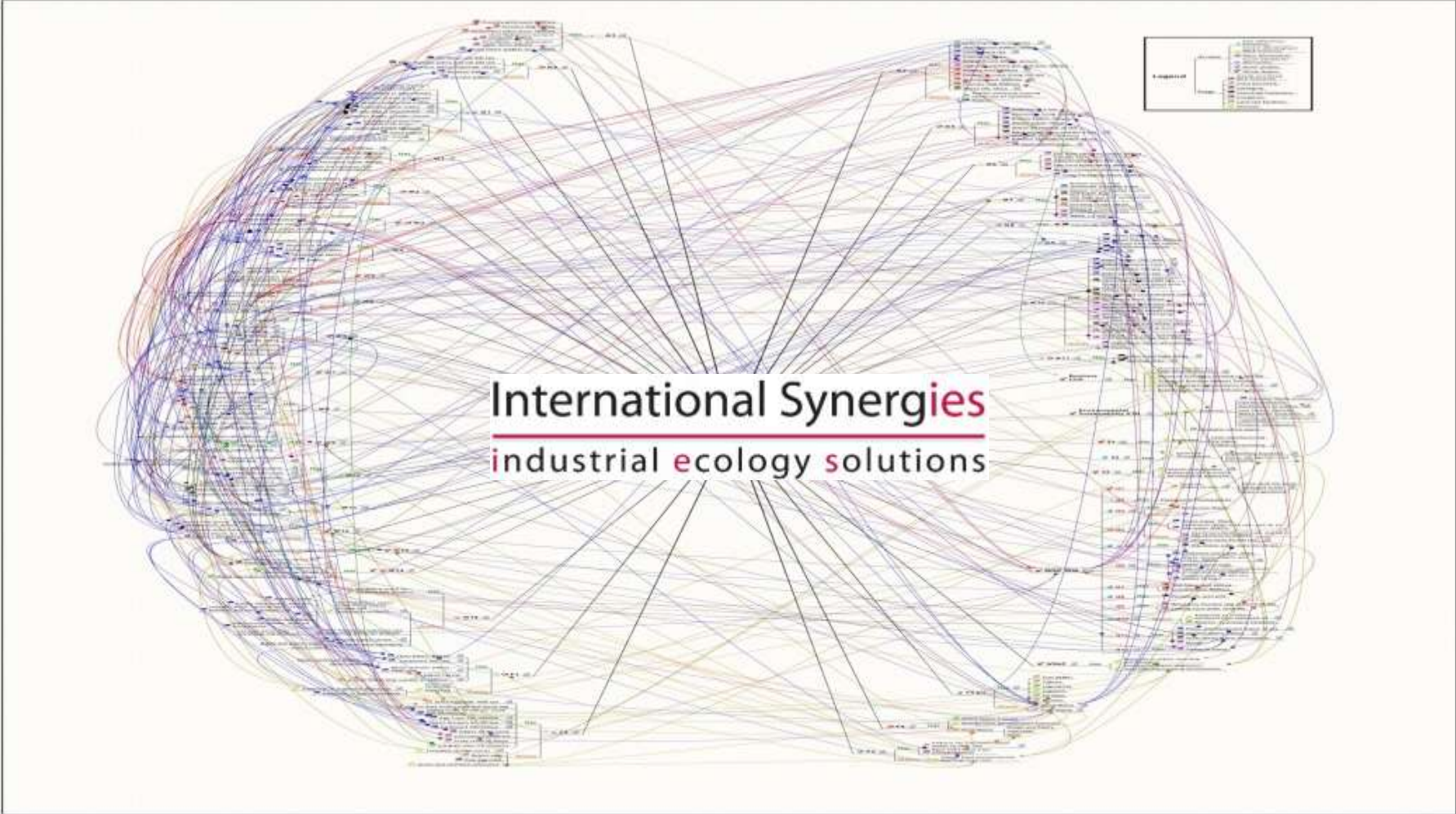
SDG 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
SDG 9	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation
SDG 12	Ensure sustainable consumption and production patterns
SDG 13	Take urgent action to combat climate change and its impacts
SDG 17	Strengthen the means of implementation and revitalise the global partnership for sustainable development

Engagement is at the Heart of NISP: Connecting Industry - Creating Opportunity

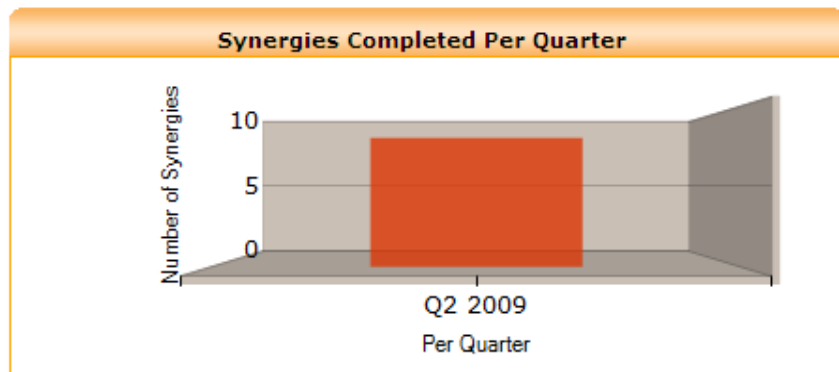
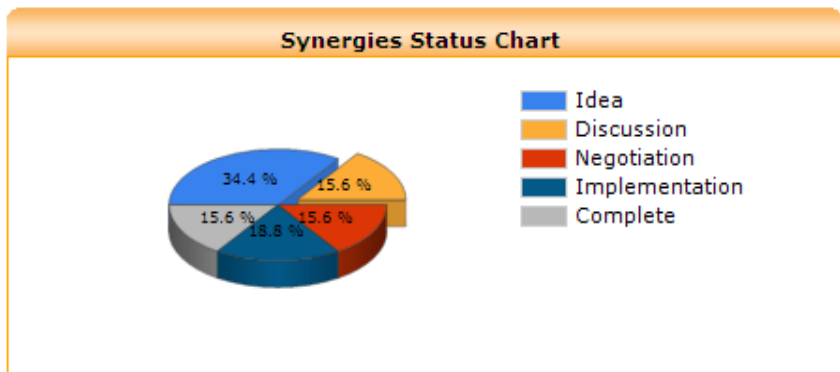


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industrial ecology solutions

Opportunity Mapping



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My Actions

Id	Status	Due Date	Action Against	
95	Overdue	6/2/2009 12:00 AM	ISL	
14	Pending	6/17/2009 12:00 AM	NISP	
15	Pending	6/17/2009 12:00 AM	Robert Brown	
32	Pending	6/18/2009 12:00 PM	Jon Smith	
23	Pending	6/24/2009 12:00 AM	Reduce Printing Costs	

Work in Progress Synergies

Id	Name	Stage
41	Synergy 41	Discussion
30	Move waste plastic	Completion
14	Scotland Synergy	Discussion
8	Help Airports	Idea
7	Reduce Printing Costs	Idea

Completed Synergies

Id	Name	Completion Date
15	Reduce Waste	6/26/2009
13	Patni Test Synergy	6/24/2009

Notifications

Resource Name	Synergy Id	Inc/Decr Resource	Delete
Asbestos	30		
Asbestos	30		
Patni Project Have	14		
Plastic Crates	14		
Plastic Crates	14		

Thousands of Case Studies (Synergies)

A fruitful collaboration

ORGANISATIONS INVOLVED
Terra Biogen (UK) Limited
John Bower (UK)

SUMMARY
NISP works best in working with members Terra Biogen (UK) Limited and John Bower (UK) in a fruitful collaboration aimed at making biodegradable (B) such as potatoes in a biodegradable form of your home, making it possible to use biodegradable (B) for your home.

BACKGROUND
Terra Biogen is part of Terra Biogen Inc, a leading international producer of organic products and materials. Following its formation in 2007, the company has been successful in developing a range of products that are biodegradable and can be used in a wide range of applications. The UK market for biodegradable products is growing rapidly and the company is looking to expand its presence in this market.

THE NISP CONNECTION
NISP worked with Terra Biogen to identify alternative ways to use biodegradable products in the UK market. This was achieved through the NISP Sustainable Packaging Programme, which aims to promote the use of biodegradable products in the UK market.

ACHIEVEMENTS
• 100% biodegradable
• 100% compostable
• 100% recyclable
• 100% reusable

CONTACT DETAILS
Terra Biogen, International Marketing, NISP, 1000 1000
1000 1000, 1000 1000, 1000 1000, 1000 1000

www.nisp.org.uk

Alternative uses for waste beer

ORGANISATIONS INVOLVED
Diageo (UK) Ltd

SUMMARY
Diageo, one of the world's leading producers of alcoholic beverages, has been successful in developing a range of products that are biodegradable and can be used in a wide range of applications. The UK market for biodegradable products is growing rapidly and the company is looking to expand its presence in this market.

BACKGROUND
Diageo produces beer and has been successful in developing a range of products that are biodegradable and can be used in a wide range of applications. The UK market for biodegradable products is growing rapidly and the company is looking to expand its presence in this market.

THE NISP CONNECTION
NISP worked with Diageo to identify alternative ways to use biodegradable products in the UK market. This was achieved through the NISP Sustainable Packaging Programme, which aims to promote the use of biodegradable products in the UK market.

ACHIEVEMENTS
• 100% biodegradable
• 100% compostable
• 100% recyclable
• 100% reusable

CONTACT DETAILS
Diageo, 1000 1000, 1000 1000, 1000 1000, 1000 1000

www.nisp.org.uk

Case Study

Fab savings met in the UK for Michelin

ORGANISATIONS INVOLVED
Michelin (UK) Ltd

The Challenge
Michelin, one of the world's leading producers of tires, has been successful in developing a range of products that are biodegradable and can be used in a wide range of applications. The UK market for biodegradable products is growing rapidly and the company is looking to expand its presence in this market.

The Solution
NISP worked with Michelin to identify alternative ways to use biodegradable products in the UK market. This was achieved through the NISP Sustainable Packaging Programme, which aims to promote the use of biodegradable products in the UK market.

The Results
• 100% biodegradable
• 100% compostable
• 100% recyclable
• 100% reusable

CONTACT DETAILS
Michelin, 1000 1000, 1000 1000, 1000 1000, 1000 1000

www.nisp.org.uk

Case Study

Befesa, a new home for Waste Foundry Sand

ORGANISATIONS INVOLVED
Befesa (UK) Ltd

The Challenge
Befesa, one of the world's leading producers of waste foundry sand, has been successful in developing a range of products that are biodegradable and can be used in a wide range of applications. The UK market for biodegradable products is growing rapidly and the company is looking to expand its presence in this market.

The Solution
NISP worked with Befesa to identify alternative ways to use biodegradable products in the UK market. This was achieved through the NISP Sustainable Packaging Programme, which aims to promote the use of biodegradable products in the UK market.

The Results
• 100% biodegradable
• 100% compostable
• 100% recyclable
• 100% reusable

CONTACT DETAILS
Befesa, 1000 1000, 1000 1000, 1000 1000, 1000 1000

www.nisp.org.uk

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NISP® (England) Delivered Outcomes

April 2005 - March 2013

METRICS	In Year Benefits*	Lifetime Impact (Max 5 year)
Landfill diversion	9.4 million tonnes	47 million tonnes
CO ₂ reduction	8.4 million tonnes	42 million tonnes
Virgin material savings	12 million tonnes	60 million tonnes
Hazardous waste eliminated	0.4 million tonnes	2.1 million tonnes
Water savings	15 million tonnes	72 million tonnes
Cost savings	€243 million	€1.21 billion
Additional sales	€234 million	€1.17 billion
Jobs	10,000+	
Private investment	€374 million	

€43.4 million investment since 2005

*All outputs independently verified

Rate of return for Govt. 9:1

Exchange rate £1 = €1.18

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

Who was there?

- | | |
|---|---|
| 4 Degrees | Robor (Pty) Ltd |
| AA Diamonds | SAIF |
| ABSA | Sakekamer |
| AJ Polycycling | Sakepos |
| CHEP SA | Sasol |
| Clear Sky Energy | Sasol Enterprise and Supplier Development |
| Connect Me (Pty) Ltd | Selectra |
| CWI | Shell |
| Dixon Batteries | Simbalism |
| Earth Probiotic Recycling Solutions (Pty) Ltd | Splendid Creations |
| Fiber & Plastic Technology | Standard Bank |
| Industrial Distillers & Refiners | The Innovation Hub Management Company |
| LEHALIMA | Torch |
| Metso Minerals | University of Johannesburg – Metal Casting Technology Station |
| NCP Chlorchem | UPHAWU Metallurgical Services |
| NOVEAL SA | Vaal University of Technology |
| North West University Vaal | XILO Technology |
| Plastic SA | |
| Prevail Engineering (Pty) Ltd | |
| RE-SA | |

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 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

“ What did they say? ”

“This will be a fantastic opportunity to achieve numerous green economy objectives”

- Karien Erasmus
Promethium Carbon

“Think that IS can generate vast opportunities in my business and open other opportunities.”

-Deena Moodley
A J Polycycling

“Huge potential for new SMEs to develop and job creation”

- Basani Mametja
ABSA Bank

”

nergies

Industrial ecology solutions

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

(Lombardi and Laybourn, 2012. J. Industrial Ecology)

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

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

Input Required by NISP April 2005 - March 2010	
Benefit generated through NISP	Actual
£1 new income for industry	2 pence
£1 cost saving for industry	3 pence
1 tonne of virgin material saved	41 pence
1 tonne of water saved	41 pence
1 tonne of CO ₂ reduced	65 pence
1 tonne of waste diverted from landfill	56 pence
1 tonne of hazardous waste eliminated	£10.86










*Scenario 1 - Persistence effect with 20% decay per annum
 *Scenario 2 - Persistence effect with 0% decay per annum

The above figures are based on total investment of £27,850,000 between April 2005 and March 2010 and relate to outputs generated in England only.

NISP Economic Valuation Report, by Manchester Economics 2009

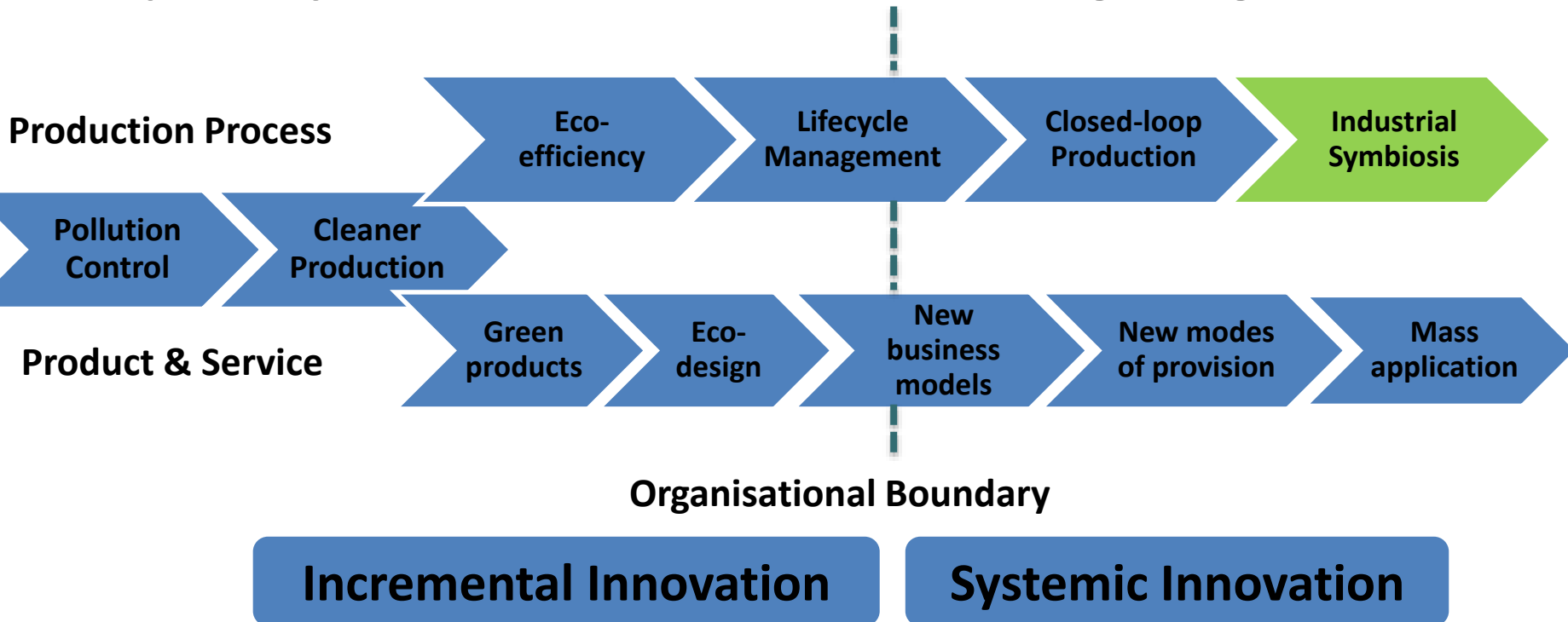
We've achieved:

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**
- 2013  International Synergies organises a Public Private Partnership on industrial symbiosis for the **Global Green Growth Forum (3GF)**
- 2013  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**)
- 2010  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 Identifies Industrial Symbiosis as Critical to Green Growth Agenda

OECD declared industrial symbiosis 'a la NISP' to be "an excellent example of systemic innovation vital for future green growth"



European Commission promotes industrial symbiosis for eco-innovation & green growth

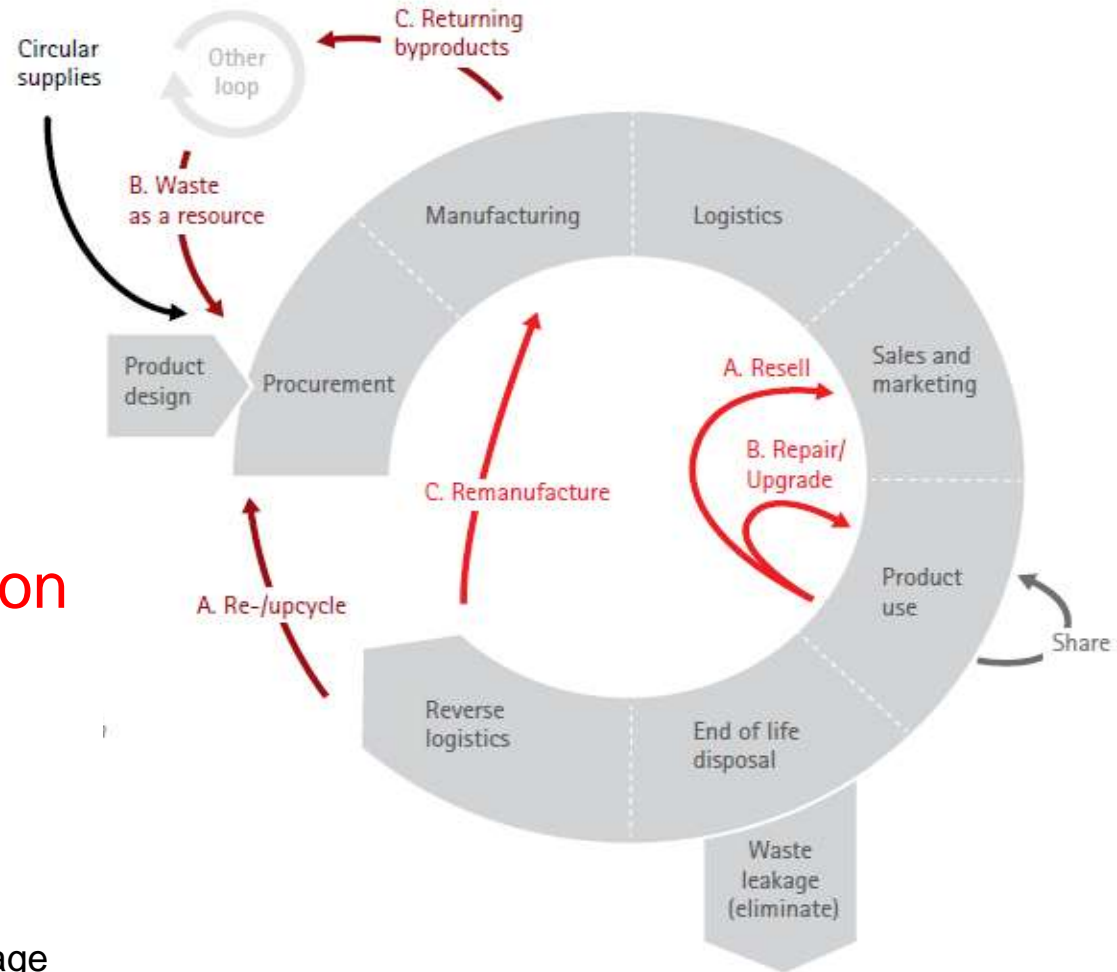
- European Waste Framework Directive - Best Practice (2009)*
- Roadmap to a Resource Efficient Europe – exemplar (2011)*
- DG Regions: Connecting Smart and Sustainable Growth through Smart Specialisation – exemplar (2012)*
- DG Enterprise: Communique on Green Entrepreneurship (2013)
- European Resource 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)

+ Turkey, South Africa and others

* Citing NISP ®

Circular Economy Business Models

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



Accenture, 2014, Circular Advantage

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Circular economy recommendations for industrial symbiosis:

- Accenture 2014 Circular Advantage
- Globescan 2015 www.govsgocircular.com

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

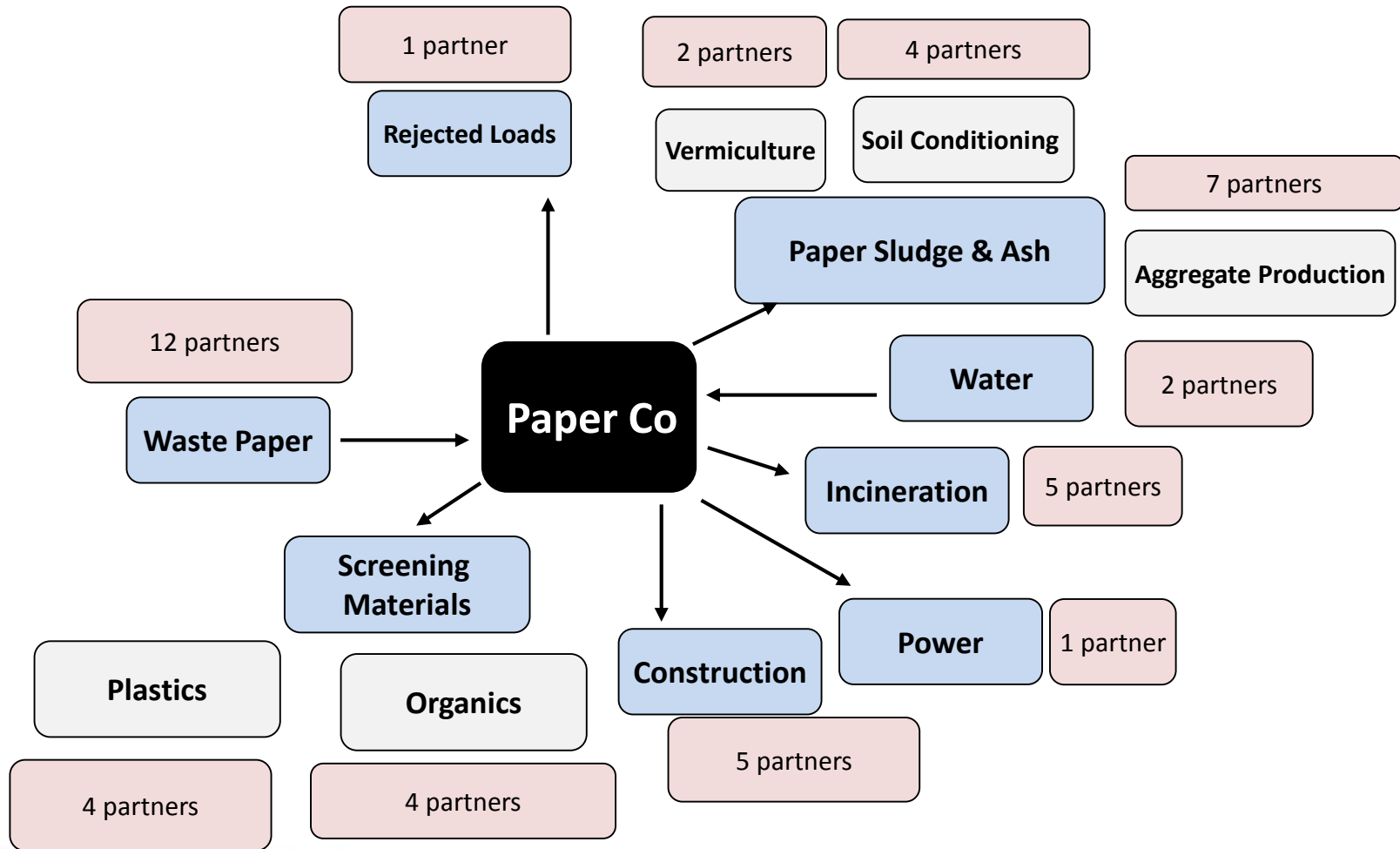
Report co-authored by Accenture, De Groene Zaak, EY, IMSA and Royal Haskoning DHV

- FP7 POLFREE & DYNAMIX 2015 (Top 10)
- Manufacturing Commission 2015 Industrial Evolution

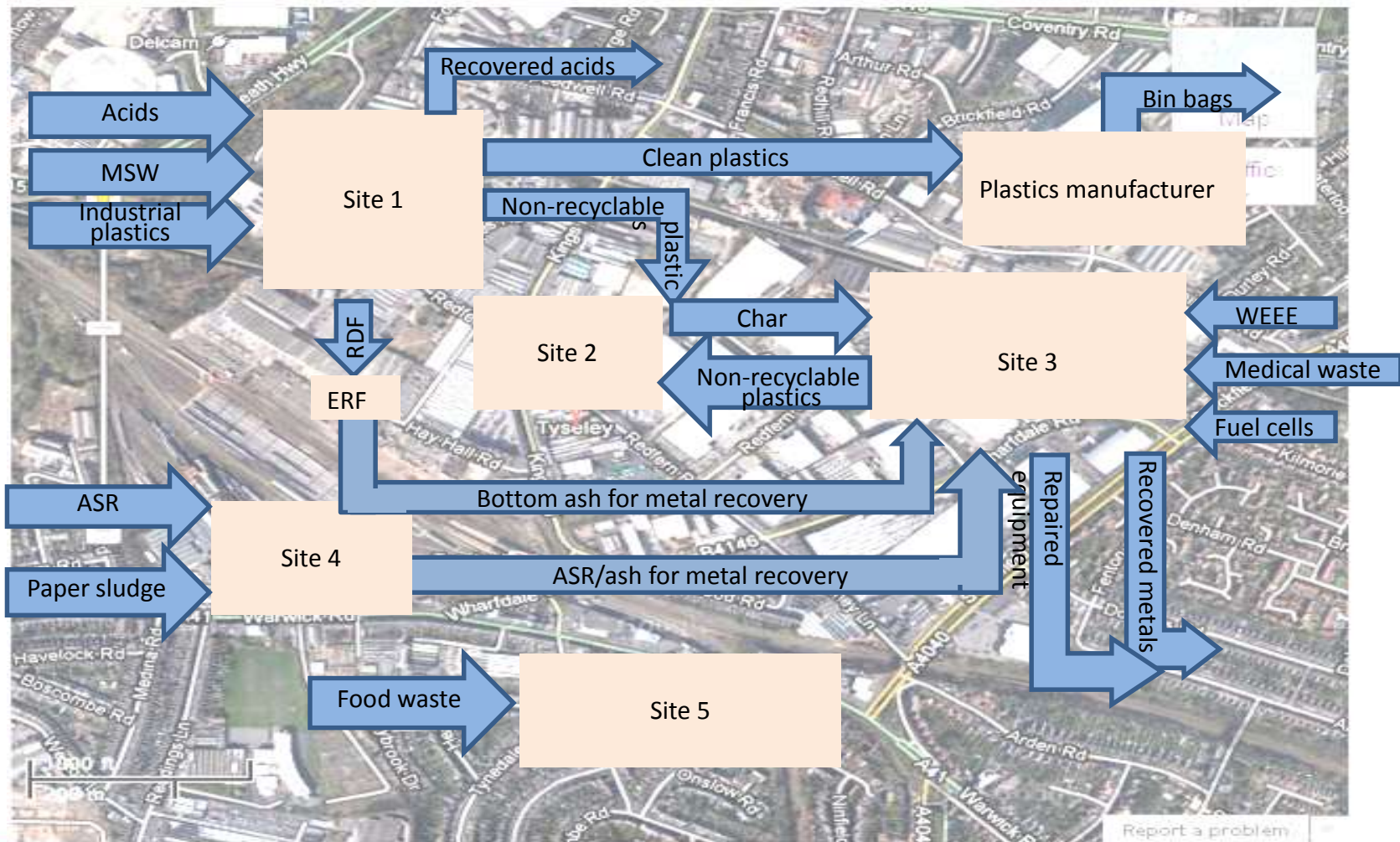
Steady stream of innovative applications

- 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



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



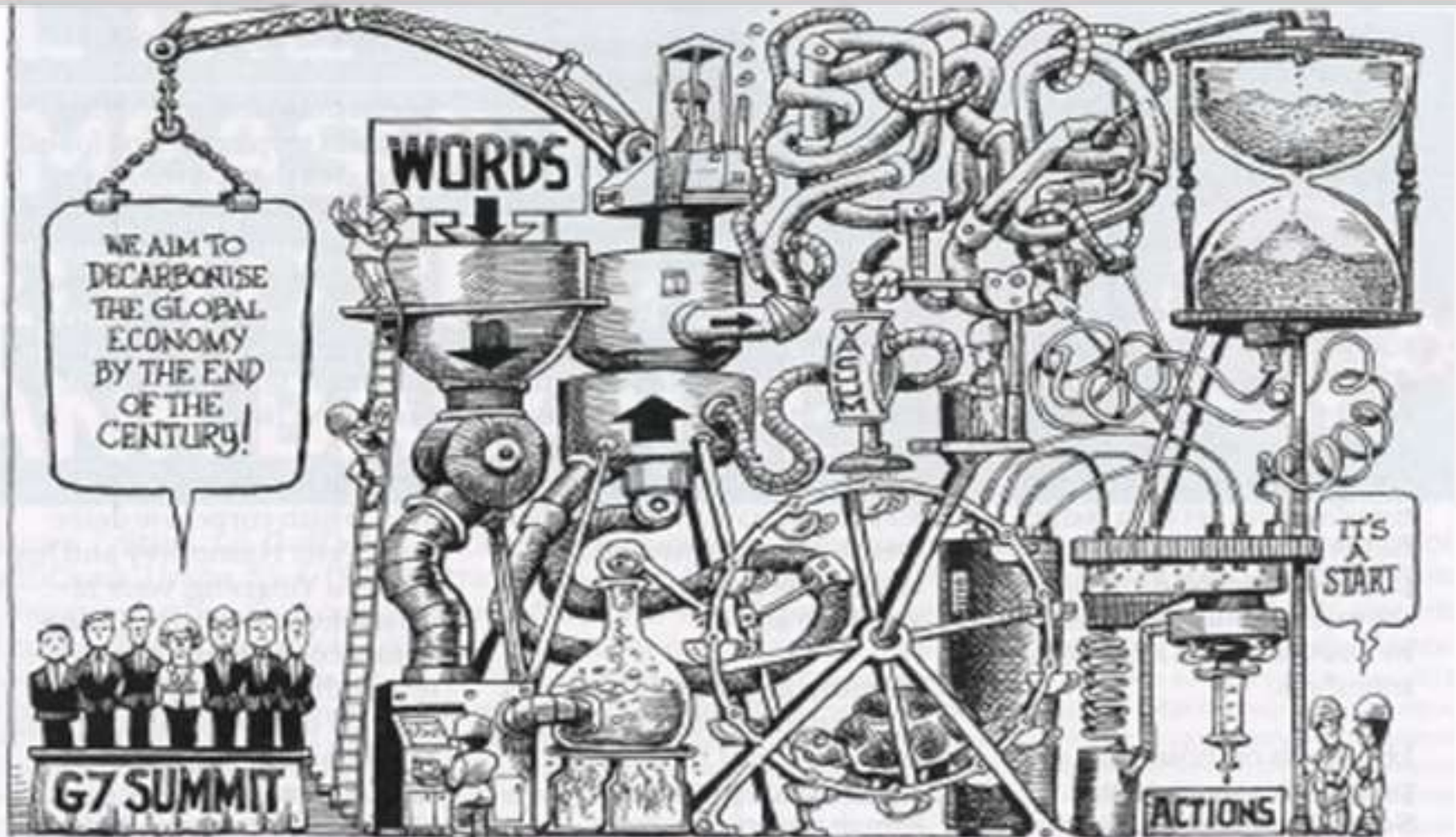
Concluding Remarks

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



The Economist June 13th-19th 2015 page 10 (V.415, #8942)

International Synergies

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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

Heinz Leuenberger - 2014

Former Director of Environmental Branch UNIDO

“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



International Synergies
industrial ecology solutions