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Industrial symbiosis: A tool for the Green Deal

Market Potential and IS assessment

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Mapping IS

Role of coordination nodes

Typologies of IS ventures

Success factors, drivers and barriers

Key features and their impact on network performance

Policy implementation routes

Online repository of good practices

Assessment

Policy assessment of existing public initiatives

SWOT of cooperation mechanisms

Needs assessment of creation of EU level platform

Feasibility and alternatives for creating EU platform

Recommendations

Ways to effectively promote IS ventures

Policies to promote IS

Ranked options for EU level platform

Dialogue with key stakeholders

Source

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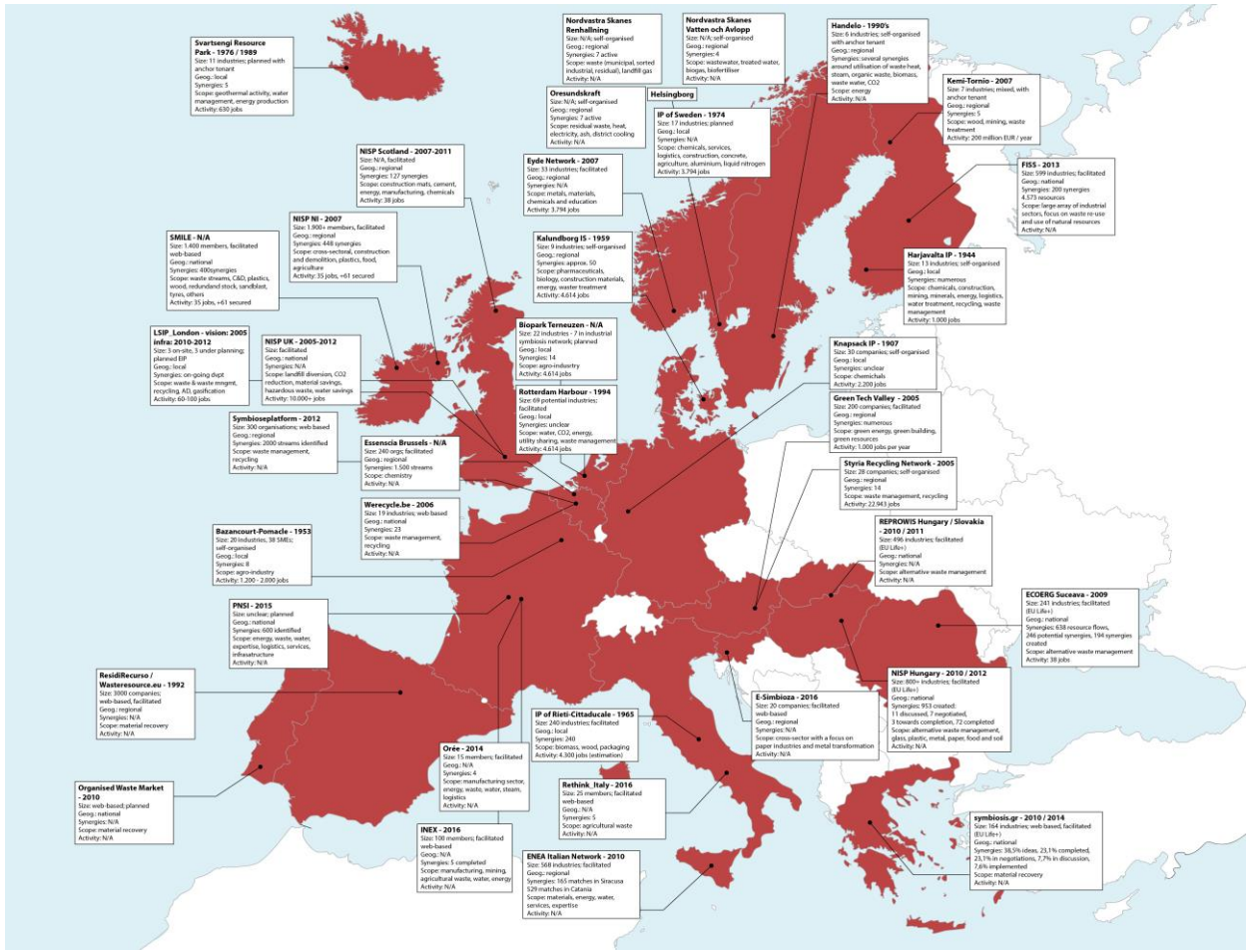
Mapping IS in Europe

- Great disparity of IS implementation across Europe
- Evidence of self-organised, planned and facilitated activity
- Large variation of network size and geographical scope (from local, close-knitted networks to large networks) (mean size is 473 members while median is 100 members)
- Self-organised activity tends to emerge alongside industrial clusters and primary activity
- Geographical patterns vary by type of waste streams
- Reported economic and environmental benefits from both self-organised and facilitated activity are substantial
- There is a lack of standardised frameworks to assess impact and reporting standards



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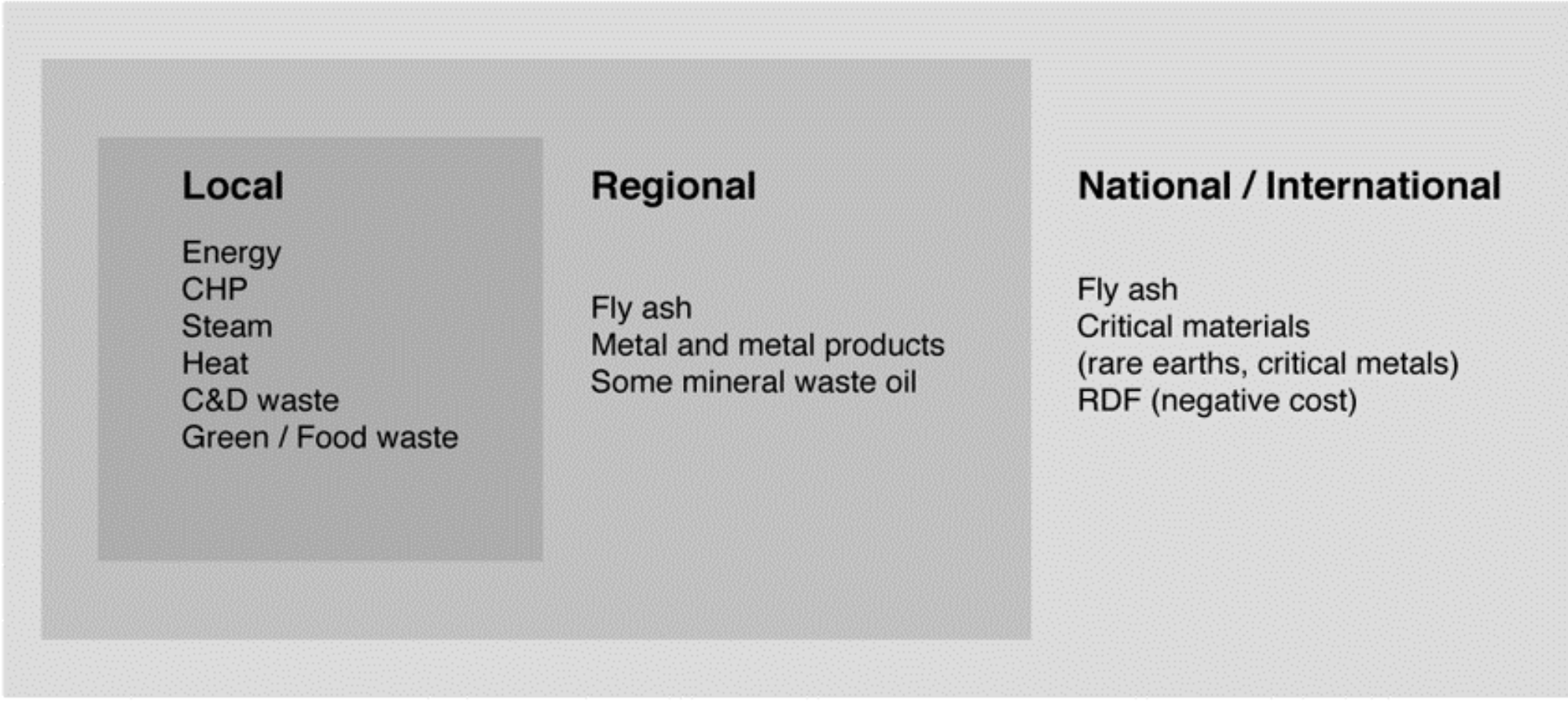
Geographical Reach



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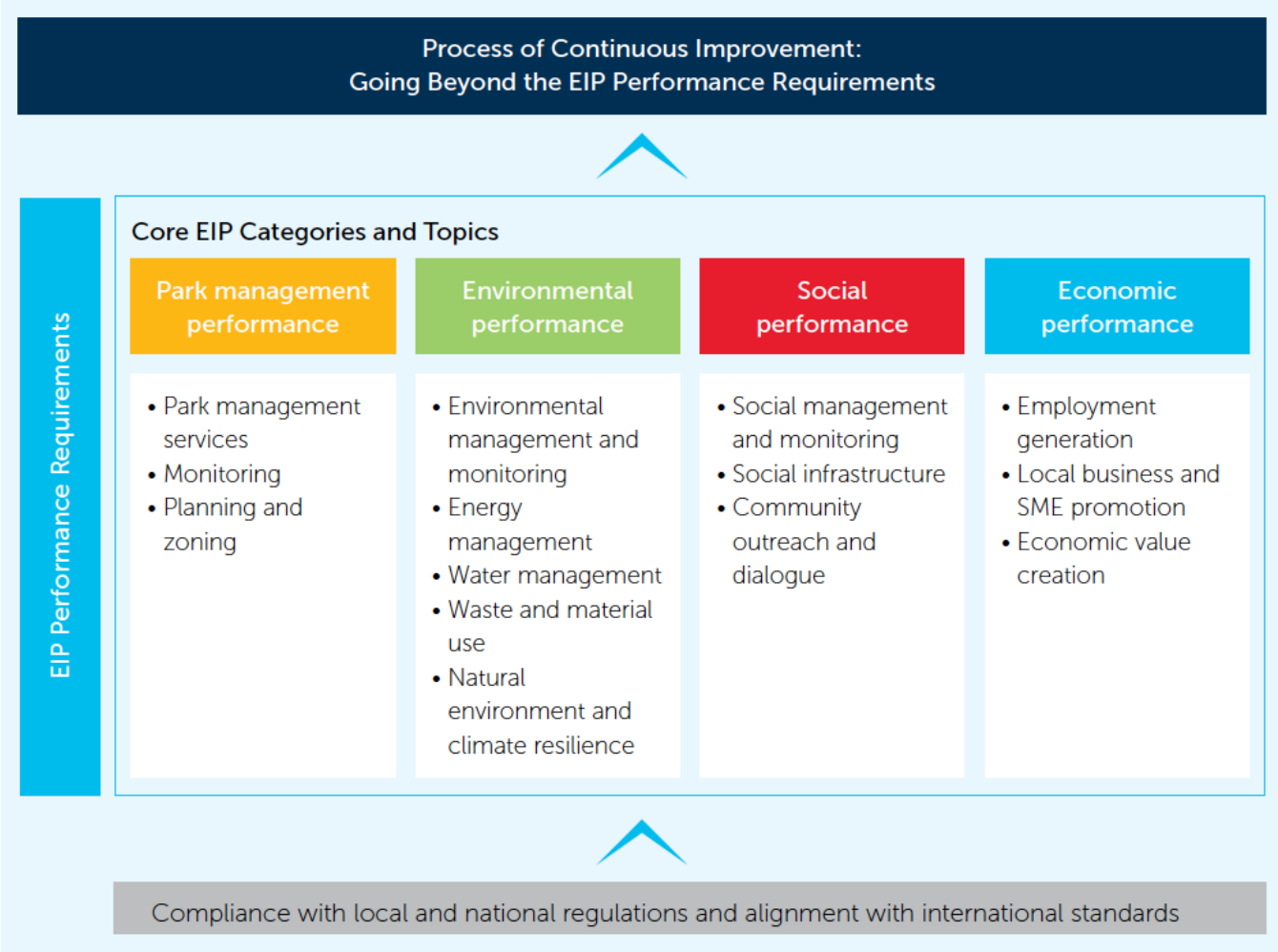
ASSESSMENT FRAMEWORKS (1)



SOURCE: World Bank & UNIDO, 2017

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ASSESSMENT FRAMEWORKS (2)

Table 2
Evaluation indicators for National Eco-industrial Parks (HJ/T274-2015).

Groups	NO.	Indicators	Units	Standard	Remarks
Economic development	1	**The proportion of high tech enterprises output value of gross industrial output value**	%	≥30	At least one indicator shall reach the standard
	2	Industrial added value per capita	10^4¥/Person	≥15	
	3	**The average three-year growth rate of industrial added value**	%	≥15	
	4	**The proportion of remanufacturing industry added value of the gross industrial added value**	%	≥30	
Industrial symbiosis	5	**The added eco-industrial chain numbers after enforcing EIP demonstration program**	Unit	≥6	required
	6	Comprehensive utilization rate of industrial solid waste	%	≥70	At least one indicator shall reach the standard
	7	**Usage rate of renewable resources**	%	≥80	
Resource conservation	8	**Industrial added value per unit industrial land area**	Hundred million/Square kilometers	≥9	At least one indicator shall reach the standard
	9	**The average three-year annual growth rate of industrial added value per unit industrial land area**	%	≥6	
	10	**Elastic coefficient of comprehensive energy consumption**	–	-When annual growth rate of industrial added value in the EIP demonstration period is > 0: the value must be ≤0.6; -When annual growth rate of industrial added value in the EIP demonstration period is < 0: the value must be ≥0.6	required
	11	Energy consumption per unit of industrial added value	Metric ton of standard coal/10^4 RMB	≤0.5	At least one indicator shall reach the standard
	12	**Application ratio of Renewable energy**	%	≥9	
	13	**Elastic coefficient of fresh water consumption**	–	-When annual growth rate of industrial added value in the EIP demonstration period is > 0: ≤0.55; -When annual growth rate of industrial added value in the EIP demonstration period is < 0: ≥0.55	required
	14	Fresh water consumption per unit industrial added value	$m^3/10^4$RMB	≤8	At least one indicator shall reach the standard
	15	Recycling rate of industrial water	%	≥75	
	16	**Reuse rate of reclaimed water**	%	-Water deficient cities > 20%; -Jing-Jin-Ji areas > 30%; -Other areas > 10%	
Environmental protection	17	Rate of reaching the discharging standard for key pollution sources	%	Meet the standard	required
	18	**The conditions of national and local key pollutant emissions**	–	Meet the standard	required
	19	Frequency of severe environmental accidents	–	0	required
	20	**Completion degree of Environmental management strategies**	%	100	required
	21	Implementation rate of key enterprises' Clean production audit	%	100	required
	22	Centralized sewage treatment facilities	–	exist	required
	23	The completion rate of environmental risk prevention and control system	%	100	required
	24	Utilization rate of industrial solid waste(including hazardous wastes)	%	100	required
	25	Elastic coefficient of main pollutant emissions	–	-When annual growth rate of industrial added value in the EIP demonstration period is > 0: the value must be ≤0.3; -When annual growth rate of industrial added value in the construction period is < 0: the value must be ≥0.3	required
	26	The annual reduction rate of carbon dioxide emissions per unit industrial added value	%	≥3	required
	27	Waste water emission per unit industrial added value	T/10^4RMB	≤7	At least one indicator shall reach the standard
	28	Solid waste discharge per unit industrial added value	T/10^4RMB	≤0.1	
	29	Green cover percentage	%	≥15	required

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Source: Huang et al., 2019

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Assessment Frameworks in Europe: comparison of impact (1)

Comparison of impacts of facilitated programmes, per year per 1EUR Investment

	Period	Network Size	Number of sy	landfill divers	GHG savings	Virgin raw m	Hazardous w	water saving	Cost savings	Additonal sal	Private inves
NISP Scotlan	2007-2011		127 complet	0.24398047	0.15170547				3.6328125	1.5625	6.2578125
NISP Hungar	2010-2012	800+	72 complete	0.00149761	0.00472768	0.00156021		0.03			
NISP UK	2005-2012	15000+		1.01374183	0.87857626	1.30660059	0.04505519	1.59945934	27.2583915		38.3194413
Romania ECC	2009-2011	200+	200 synergie	0.6017462	0.14759812						
Invest NI	2007-2017	1900+	448	0.15076923	0.13076923	0.09230769	0.00488462		10.6692308	6.91538462	0.81153846
PNSI	2015-2017*	588+	958 potentia	0.06133442	0.00475353	0.01722963			1.12781575	15.2843659	0.16548359
SMILE	2015-2016***		1559 potenti	0.07390667					14.7967367		

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Assessment Frameworks in Europe: Benchmarks (2)

	LOW	MEDIUM	HIGH
GHG SAVINGS (T, CO2e) per 1 EUR Investment	0.00475353	0.14759812	0.87857626
1 Tonne GHG avoided	€210	€6.77	€1.13
Landfill diversion, per EUR Investment	0.006133442	0.6017462	1.01374183
1Tonne Landfill diversion	€16.3	€1.66	€0.98
Cost savings (from carbon taxation 7.59€ at 29-11-2017)	€0.036	€1.12	€6.67
Cost savings (landfill tax-Average €80.75)	€0.49	€48.53	€81.75

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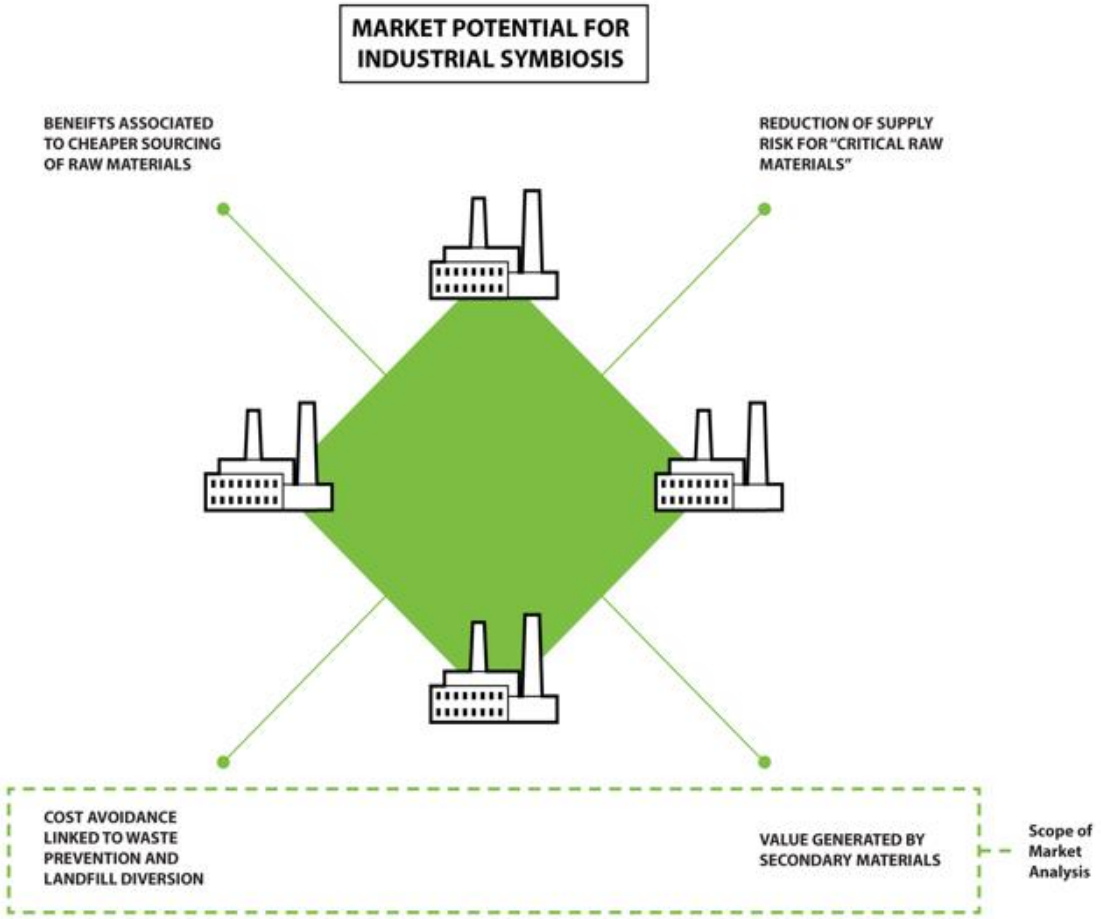
- Our approach:
- (1) Waste stream potential
- (2) Landfill diversion potential



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Waste stream potential approach (1)

- Plastics – up to €2.4bn per year
- Food – around €100-425 million per year
- WEEE - €2.1bn per year current, increasing to €3.7bn per year in future
- CD&W – growth potential from €0.8bn per year current to €1.4bn

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Waste stream potential approach (2)

- Textiles – up to €270 million per year
- Wood – potential in range of up to €2.7bn
- Used Oil – up to €1.6 billion potential
- Total – potentially > €5bn per year – although significant limitations to this figure it does give a reasonable order of magnitude estimate

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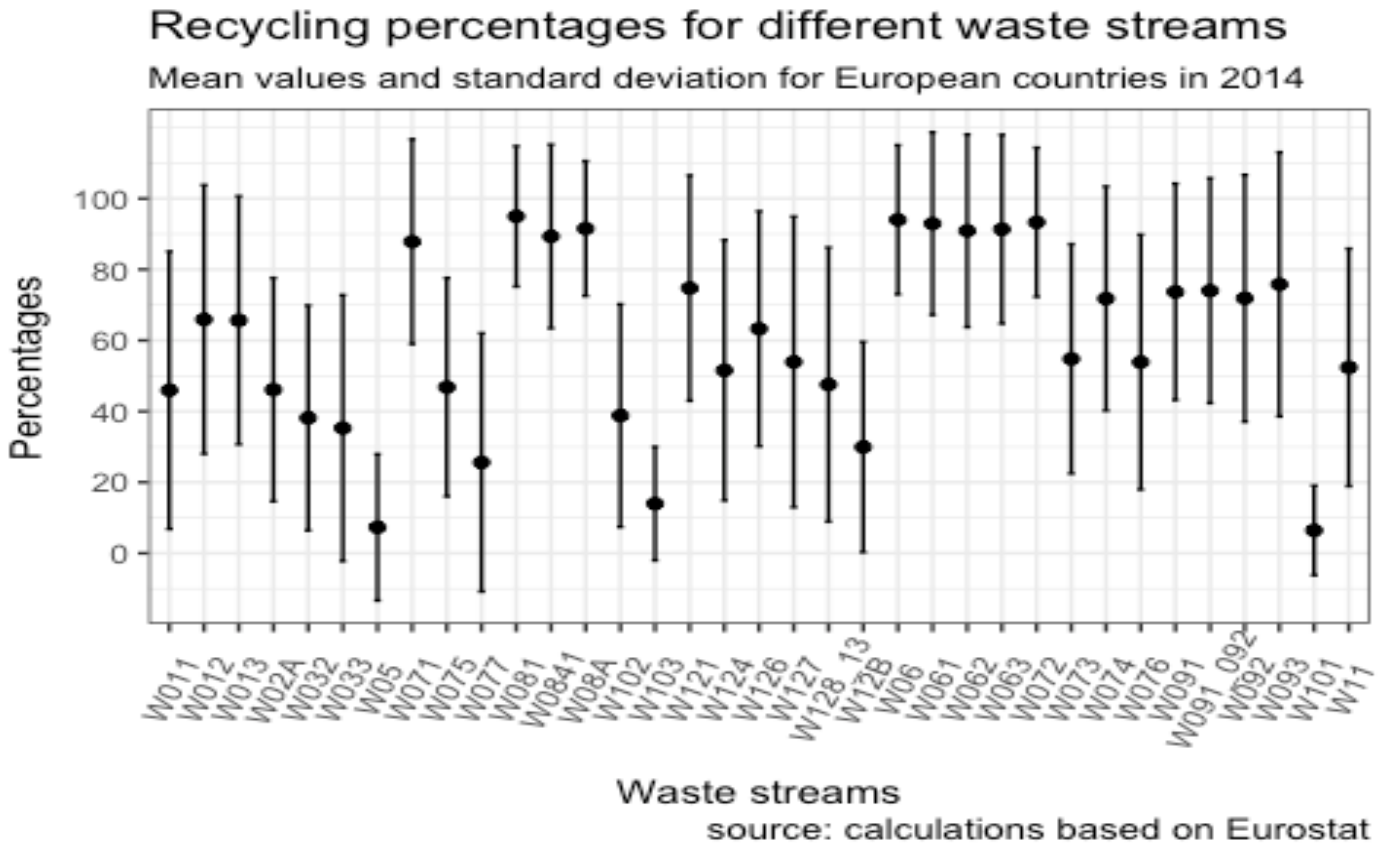
Cost avoidance approach

- High potential for cost savings linked to landfill cost avoidance
- High estimate is that this could be in the region of €72 bill.
- Great disparities between MSs. Gap best and worst performers means opportunities for IS
- Given its volume, most opportunities are connected with the C&D sector
- Other types of waste such as chemical and recyclable waste show great potential



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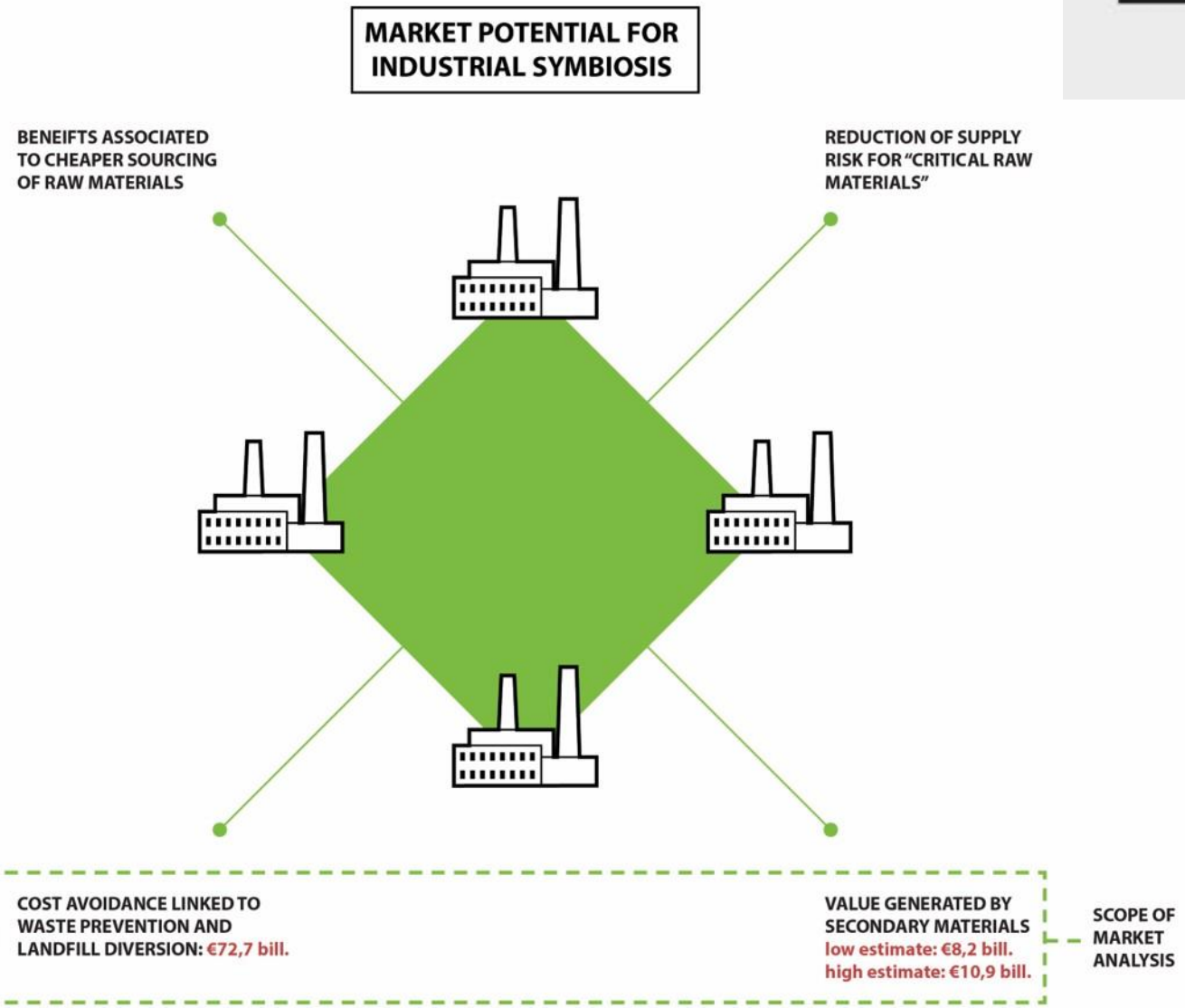

Key conclusions

- The market analysis suggest a substantial untapped potential for IS in Europe
- Assessment of facilitation identifies divergences in the performance of programmes but also suggest that through facilitation environmental targets such as landfill diversion and CO2 savings are made at a relatively low cost and combined with economic benefits in terms of economic cost savings and private investment
- The market analysis seem also to suggest that economic instruments are insufficient to explain differences in recovery potential across countries and other factors such as framework conditions, technologies and business practices may play a fundamental role

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Thank You for your attention

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