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TRADE & CLIMATE CHANGE

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Trade and the Eco-Industry

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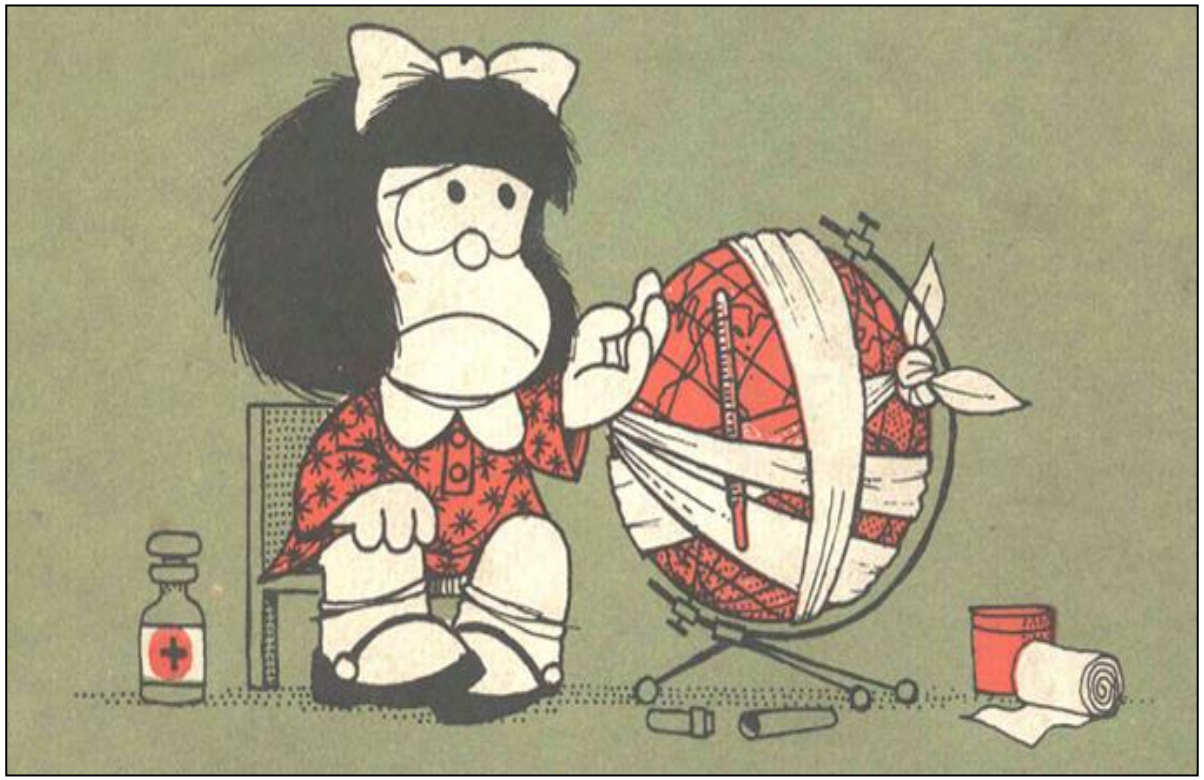
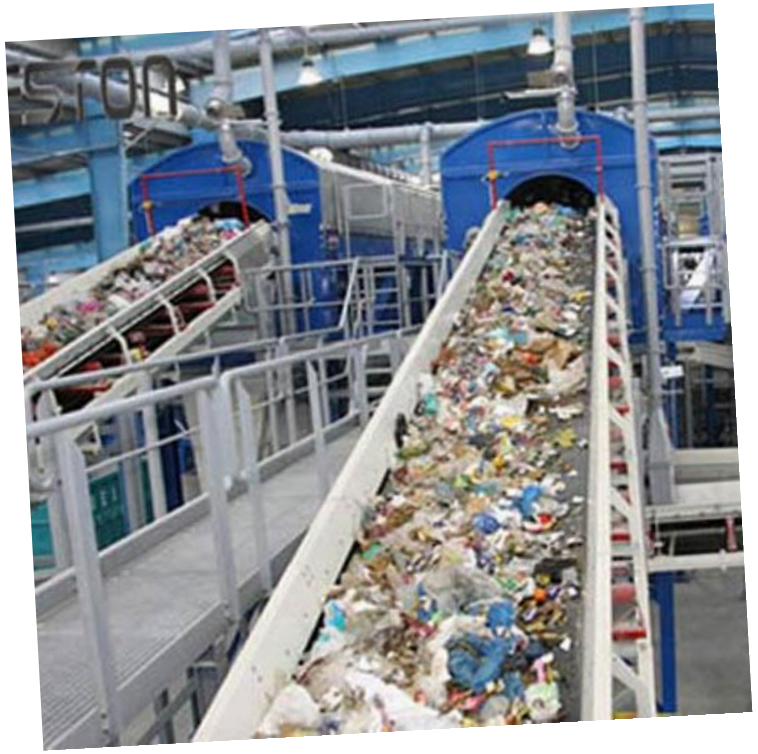


The cumulative scientific evidence is unequivocal: Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all.

- IPCC (2022) -


gettyimages
Hindustan Times
1229463680



The environmental goods & services industry

The environment industry consists of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air, and soil, as well as problems related to waste, noise and eco-systems.

These include cleaner technologies, products and services which reduce environmental risk and minimize pollution and resource use, although there is currently no agreed methodology which allows their contribution to be measured in a satisfactory way.

OECD/Eurostat 1999 definition

Box 6. Environmental goods and services

The Intergovernmental Panel on Climate Change (IPCC) has identified a range of mitigation and adaptation technologies that can assist in the challenge of climate change. Many of these technologies involve products being discussed in the WTO trade and environment negotiations. Some examples include landfill liners for methane collection, wind hydropower turbines, solar water heaters, and tanks for the production of biogas. Lowering barriers to trade in these types of products will reduce their price and make them more accessible. Increased competition will foster technological innovation in areas related to protection of the environment and climate change.

World Trade Organization (2011), *Harnessing Trade for Sustainable Development and a Green Economy*.

OUTLINE OF THIS TALK

- What is the environmental goods and services (EGS) industry?
- How can international trade contribute to the development, adaptation and diffusion of EGS's?
- How can EGS's contribute to international trade?

What is the eco-industry?

What is the EGS industry?

Berg, Ferrier and Paugh (1998), US Dpt of Commerce Report:

*"The domestic industry that provides environmental products and services is **one of the least understood sectors** within American industry, despite its size and economic importance."*

- **Young**

and fast-growing

- Big in revenue

Exhibit 18-1 The Global Environmental Market 2004- 2012 ($Billion U.S.)

Region	2004	2005	2006	2007	2008	2009	2010	2011	2012
United States	233.1	245.6	257.2	277.3	293.6	292.1	298.5	305.7	313.0
Western Europe	182.4	189.7	206.7	216.6	222.6	219.6	223.3	227.1	231.8
Japan	94.9	96.0	98.4	101.2	100.5	95.8	97.6	99.6	101.6
Rest of Asia	40.1	45.8	50.9	57.0	62.9	67.0	74.6	82.1	90.1
Mexico	4.56	5.17	5.59	6.06	6.36	6.28	6.7	7.1	7.6
Rest of Latin America	14.9	16.8	17.8	19.1	20.3	20.6	22.0	23.3	24.6
Canada	17.1	17.9	18.7	19.6	20.0	19.7	20.1	21.1	22.0
Australia/New Zealand	10.8	11.7	12.0	12.5	12.7	12.9	13.3	13.9	14.4
Central & Eastern Europe	13.3	14.7	15.2	15.7	15.8	15.0	15.4	16.0	16.7
Middle East	9.8	11.9	14.1	16.6	18.0	18.5	21.2	23.2	25.1
Africa	5.5	6.1	7.0	8.0	9.1	8.7	10.0	10.8	11.7
Total	**626**	**661.4**	**703.5**	**749.7**	**781.9**	**776.2**	**803**	**830**	**859**
Growth	**5.5%**	**5.6%**	**6.4%**	**6.6%**	**4.3%**	**-0.7%**	**3.4%**	**3.4%**	**3.5%**

Source: Environmental Business International, Inc., San Diego, Calif.

What is the EGS industry?

- Young and fast-growing
- Big in revenue
- Highly segmented

Market Segment	2004	2005	2006	2007	2008	2009	2010	2011	2012
Equipment									
Water Equipment & Chemicals	52.0	54.2	56.4	59.3	63.2	60.7	62.5	65.0	67.6
Air Pollution Control	40.6	42.5	43.9	45.3	45.1	38.8	39.7	40.7	41.8
Instruments & Info Systems	7.6	8.2	8.6	8.9	9.3	8.9	9.2	9.6	10.1
Waste Mgmt Equipment	33.4	34.1	35.1	36.3	36.6	33.7	34.0	35.1	36.1
Process & Prevention Tech	3.6	3.7	3.9	4.1	4.4	4.5	4.5	4.6	4.7
Services									
Solid Waste Management	130.1	133.6	136.7	139.7	142.8	142.1	144.3	146.1	148.0
Haz Waste Management	21.4	21.8	22.2	22.6	22.9	21.7	21.5	21.7	21.9
Consulting & Engineering	36.1	38.3	40.1	41.7	45.2	44.7	46.8	48.2	49.6
Remediation/Ind'l Services	37.7	40.0	42.0	44.1	45.7	44.3	44.8	45.3	45.7
Analytical Services	4.7	4.8	4.9	5.1	5.3	5.2	5.3	5.4	5.5
Water Treatment Works	88.0	90.6	93.1	95.9	100.8	104.2	106.8	108.5	110.2
Resources									
Water Utilities	97.2	100.5	103.5	106.5	111.5	113.8	116.4	118.7	121.1
Resource Recovery	43.3	49.0	53.9	63.6	50.0	42.5	43.8	44.6	45.5
Clean Energy Systems & Power	30.5	40.3	59.2	76.9	99.1	111.0	123.3	136.1	150.2
Total	**626.3**	**661.4**	**703.5**	**749.9**	**781.9**	**776.2**	**803**	**830**	**858**

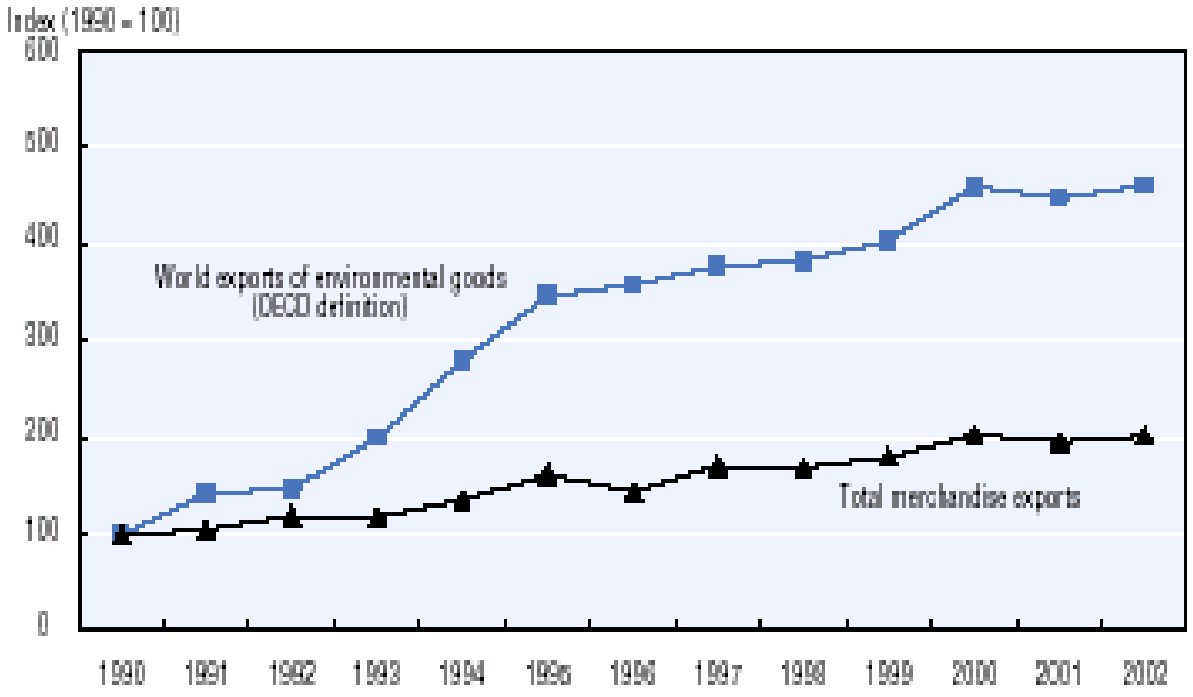
SOURCE: Environmental Business International, Inc., San Diego, Calif., units in US $bil revenues generated by private and public sector entities

What is the EGS industry?

- Young and fast-growing
- Big in revenue
- Highly segmented
- Increasingly global

Figure 1.

GROWTH OF TRADE IN ENVIRONMENTAL GOODS, 1990-2002



Source: Bijit, Bora and R. Toh (2004), "Tariffs and Trade in Environmental Goods", presentation to the WTO Workshop on Environmental Goods, Geneva.

Source: Authors elaboration based on UN Comtrade (2016), The World Bank (2016) and OECD (2005).
Notes: income classification: The World Bank (2013), GNI per capita in US$ (Atlas methodology)

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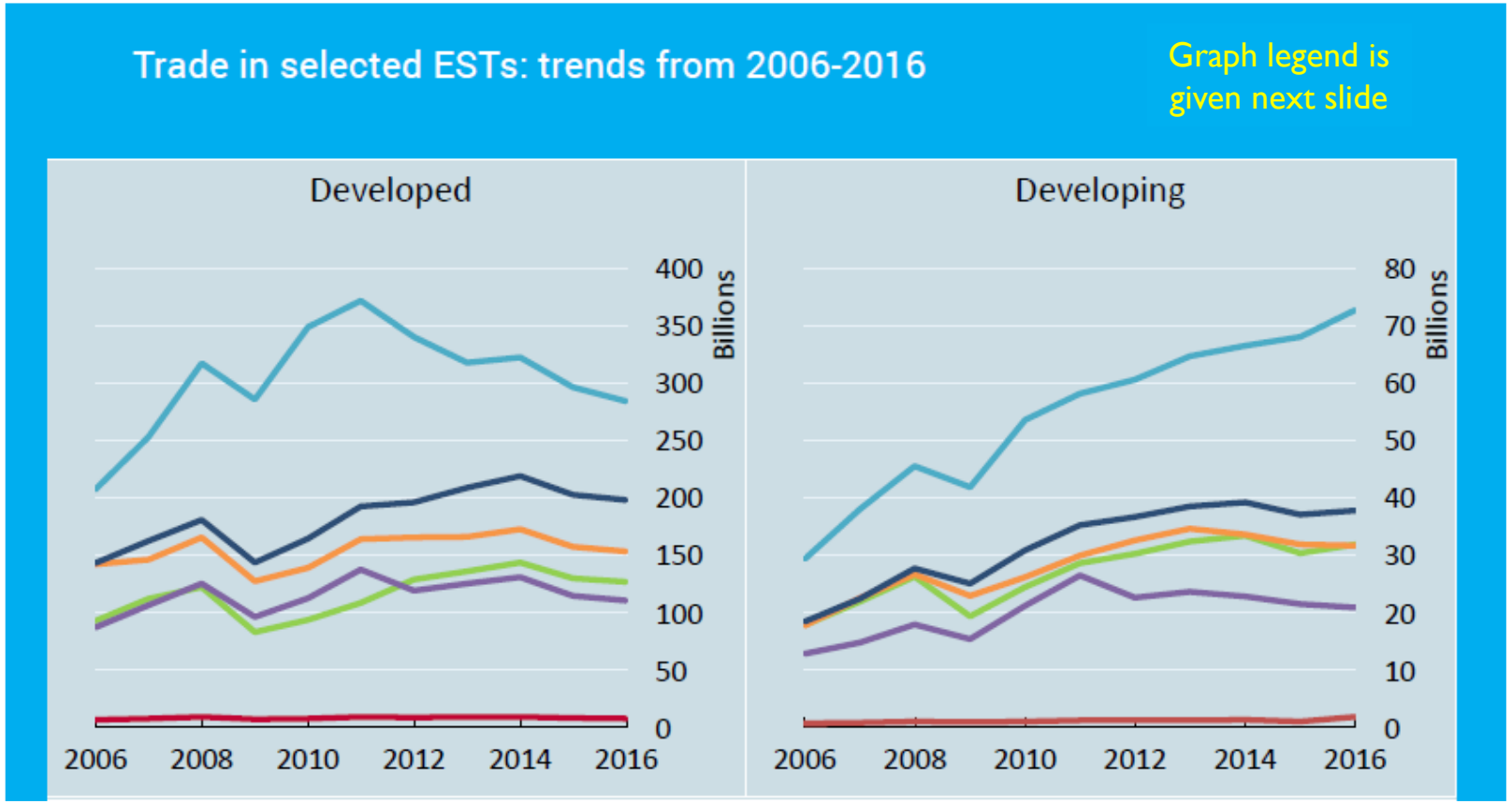
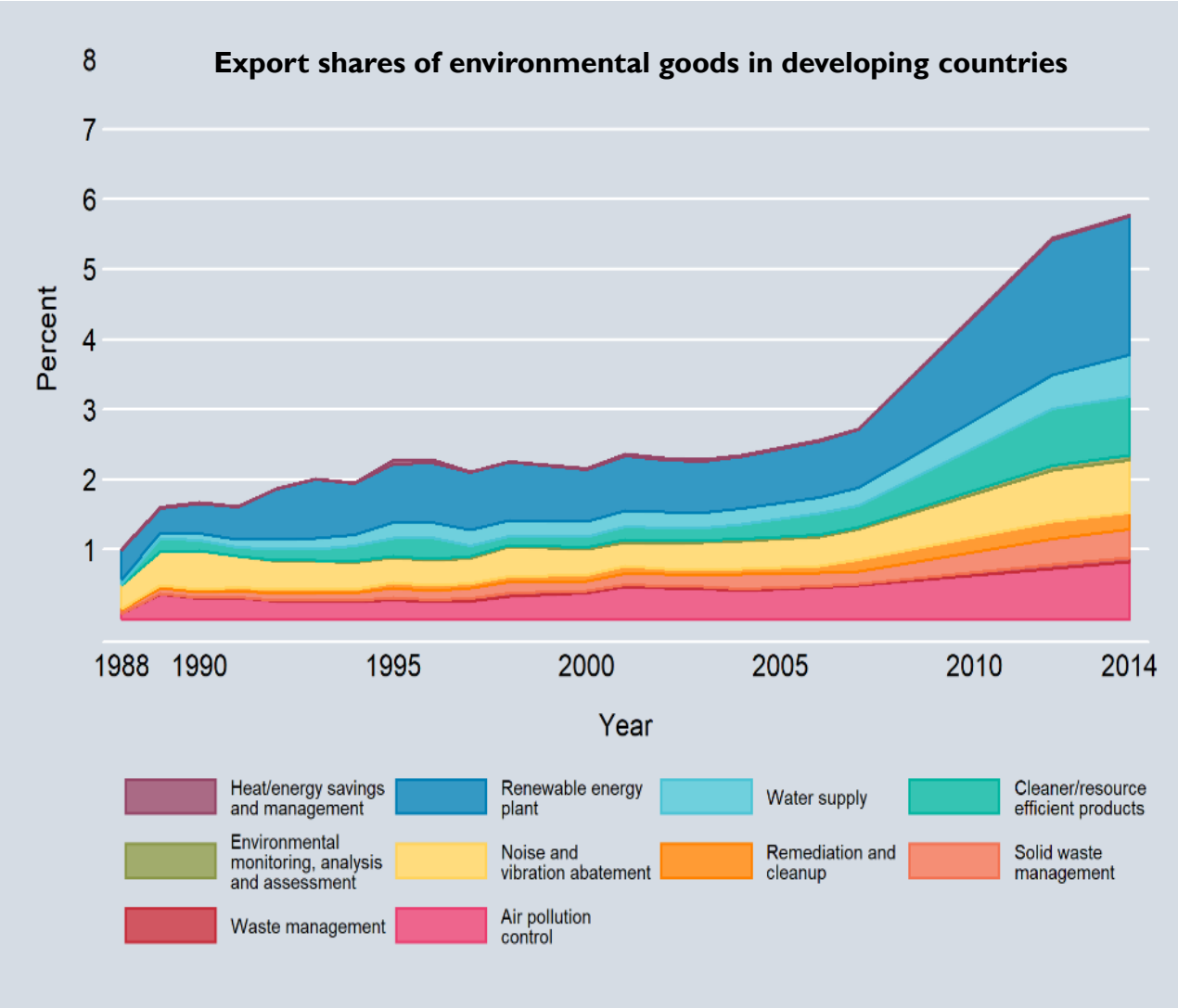
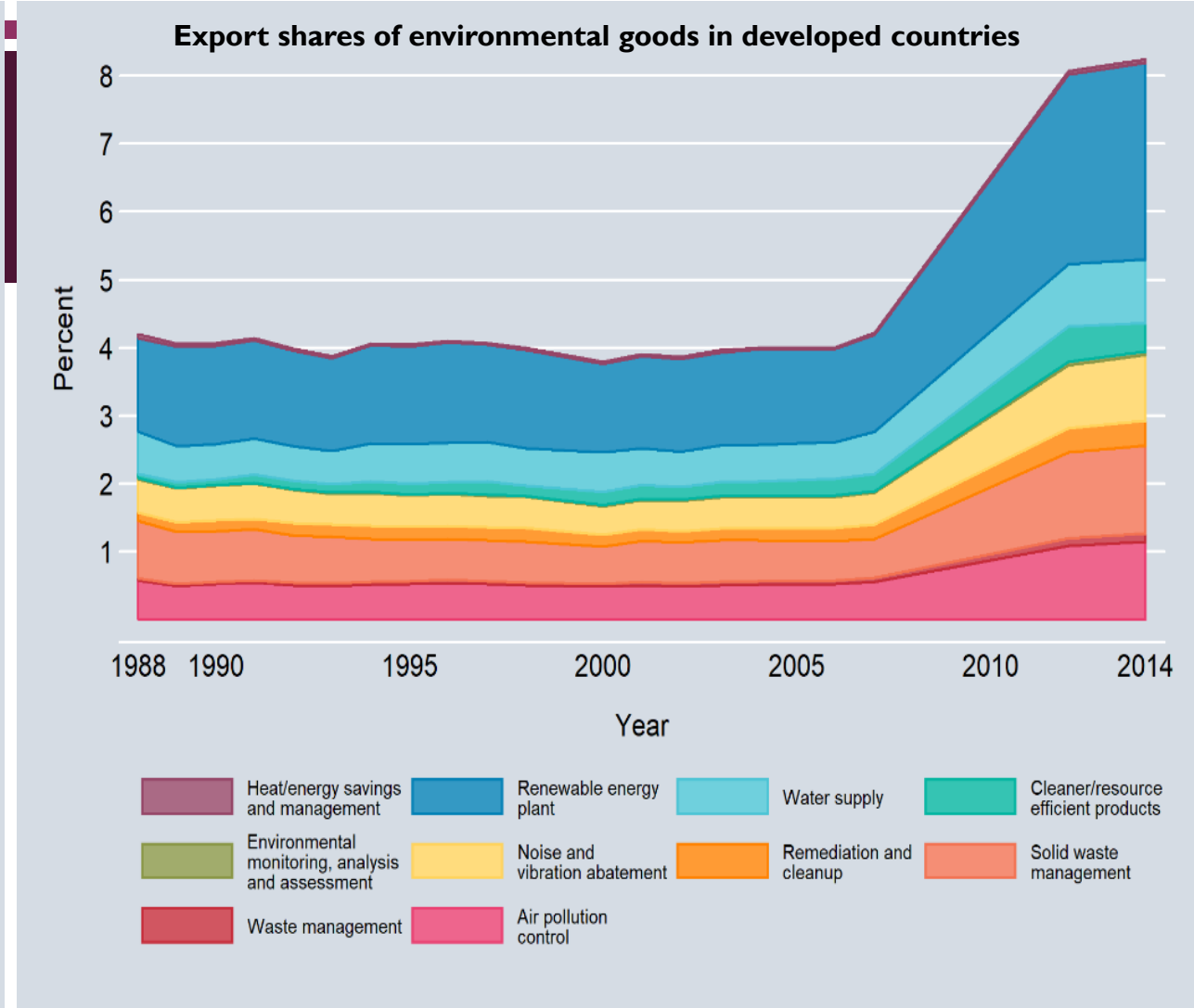
What is the EGS industry?

- Young and fast-growing
- Big in revenue
- Highly segmented
- **Increasingly global**



Source: United Nations Environment Programme (2018). *Trade in environmentally sound technologies: Implications for Developing Countries*.





Source: Authors elaboration based on UN Comtrade (2016), The World Bank (2016) and OECD (2005).
Notes: income classification: The World Bank (2013), GNI per capita in US$ (Atlas methodology)

Nicola Cantore & Charles Fang Chin Cheng, **International trade of environmental goods in gravity models,** United Nations Inclusive and Sustainable Industrial Development Working Paper Series WP 2 | 2018

What is the

- Young and fast-growing
- Big in revenue
- Highly segmented
- Increasingly global
- Oligopoly, with a competitive fringe

Exhibit 18-17 Top Global Environmental Companies, 2001

	Company	Country	Segment	Env'l Revs $mil 01
1	Vivendi Environnement SA	France	Water/SW/HW/WE&C	17,230
2	Suez (Ondeo, Sita)	France	Water/WE&C/SW	13,970
3	Waste Management	U.S.A.	Solid Waste/WME	11,320
4	Allied Waste	U.S.A.	Solid Waste	5,470
5	RWE Entsorgung AG	Germany	Solid Waste/C&E	4,790
6	Bechtel Group Inc.	U.S.A.	EC/Remed	2,640
7	Severn Trent	U.K.	Water/WW/C&E	2,380
8	Ebara Corp	Japan	W/WW/APC/SW/RIS	2,300
9	Republic Services	U.S.A.	Solid Waste	2,260
10	Mitsubishi Heavy Industries	Japan	Incin/APC/Water Equip.	2,160
11	Kubota (Ind'l Eq div.)	Japan	Equip	1,830
12	Betz Laboratories Inc. (now GE Betz)	U.S.A.	Water Treatment	1,820
13	Hochtief AG	Germany	EC	1,760
14	AWG plc (Anglian Water)	U.K.	Water	1,740
15	Shaw Group (IT Corp, S&W)	U.S.A.	C&E/Remed	1,610
16	Safety Kleen Corp.	U.S.A.	Haz Waste/Recycling	1,510
17	Earth Tech	U.S.A.	C&E	1,460
18	United Utilities	U.K.	Water/WW/Equip	1,440
19	CH2M Hill Cos.	U.S.A.	C&E	1,420
20	Vestas	Denmark	Wind Power Systems	1,280
21	Kurita Water Industries	Japan	Equipment	1,260
22	Noell Gmbh	Germany	APC/EC/SW/RR	1,100
23	Washington Group International	U.S.A.	C&E/EC	1,040
24	Fomento de Construcciones y Contratas	Spain	EC/Solid Waste	1,040
25	Hitachi Zosen	Japan	WME	970
26	Takuma (Envl Eq & M/M divs)	Japan	WME/Biogas/WEC	920
27	Kelda Group (Yorkshire)	U.K.	WU/WTW/AS/MedWaste	910
28	Philip Services	Canada	RR/Ind'l Svcs/AS	810
29	Bilfinger + Berger	Germany	EC	810
30	NEG Micon	Denmark	Wind Power Systems	790
31	Babcock Borsig (Deutsche Babcock)	Germany	WME/APC	790
32	Black & Veatch	U.S.A.	C&E/EC	730
33	Foster Wheeler Corp. (now part of Tetra Tech)	U.S.A.	EC	730
34	Linde	Germany	Equip/C&E	720
35	Fluor Daniel Inc.	U.S.A.	EC	720

What is the EGS i

- Young and fast-growing
- Big in revenue
- Highly segmented
- Increasingly global
- Oligopoly, with a competitive fringe
- Big in employment

Table 1
Overview of the environmental technology sector in the selected countries.

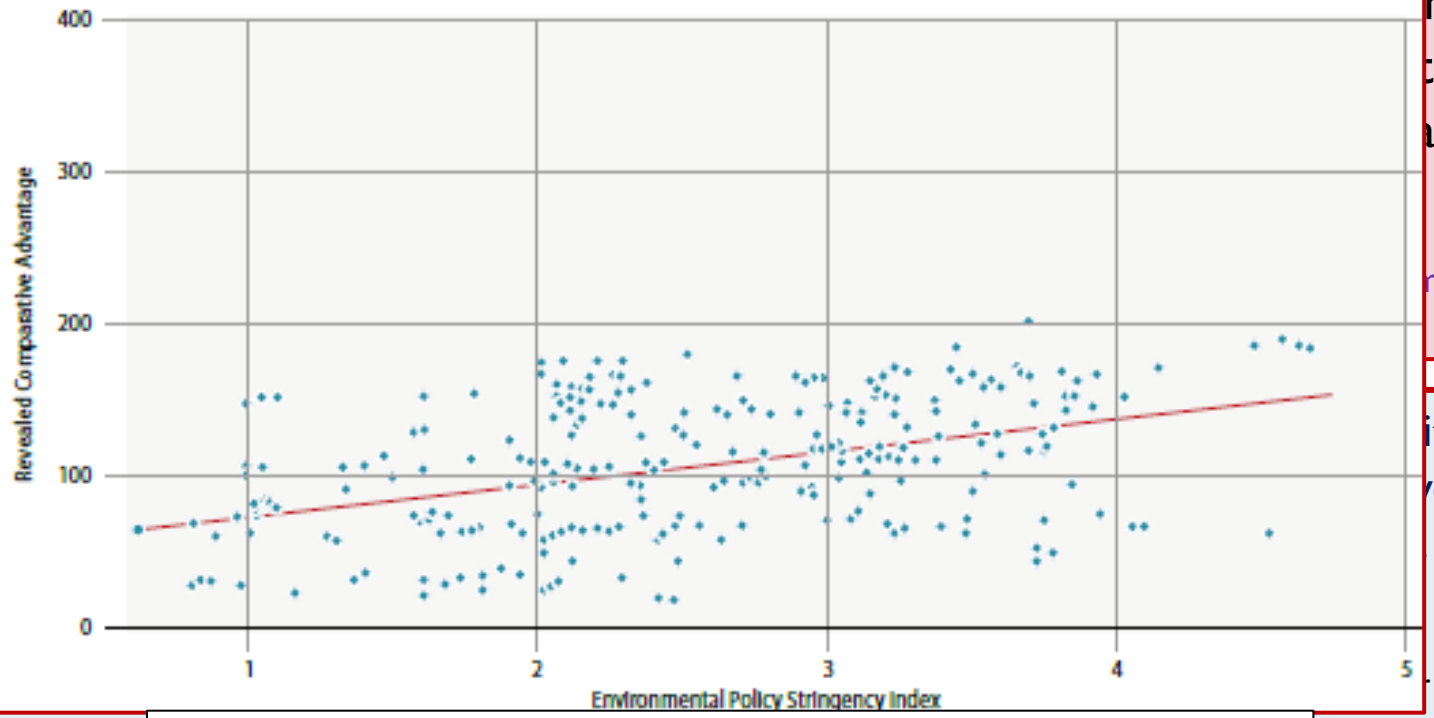
	Establishments	Employees	Turnover	Exports	Comments/Data source
Austria	N/A	185,122	EUR 36.3 million	N/A	All data from 2013 http://www.statistik.at/we eco_industries_environme
Denmark	N/A	57,953	DKK 164.5 million	DKK 65.4 million	All data from 2013 http://www.dst.dk/en/Stati http://www.statbank.dk/st tabsel&MainTable=GRON1 [a]1DKK=0.13 EUR (2013)
Finland	N/A	88,569 (2013)	EUR 21.5 million[a] EUR 24,000 million (2013)	EUR 8.5 million[a] EUR 5.1 million (2011)	http://www.tilastokeskus.f http://pxnet2.stat.fi/PXWel
Germany	6,448	218,142	EUR 52,888 million	EUR 24,183 million	All data from 2012 https://www.destatis.de/E vironmentalEconomics/Tat
Norway	1786	38,000	N/A	NOK 21.8 billion EUR 283 million[b]	All data from 2011 www.intpow.no/?id=1759 [b]1NOK=0.13 EUR (2011)
Sweden	16,434	71,980	SEK 222.4 million EUR 26.7 million[c]	SEK 37 million EUR 4.4 million[c]	All data from 2013 http://www.scb.se/en_/Fin able-development/System- 206293/ [c]1SEK=0.12 EUR (2013)
USA	119,000(2008)	3,401,279 (2011)	N/A	USD 43.8 billion (2008) EUR 30 billion[d]	http://www.bls.gov/ggs/ http://web.ita.doc.gov/ete/ OpenDocument http://environment.ita.doc [d]1USD=0.68 EUR

Wisdom Kanda, Olof Hjelm and Santiago Mejía-Dugand (2015), "Promoting the export of environmental technologies: An analysis of governmental initiatives from eight countries," *Environmental Development* 17, 73-87.

What is the EGS industry?

- Young and fast-growing
- Big in revenue
- Highly segmented
- Increasingly global
- Oligopoly, with a competitive fringe
- Big in employment
- **Policy-driven**

Figure 3. Environmental policy stringency and revealed comparative advantage in CLEG



OECD Work on Trade and the Environment - A Retrospective, 2008-2020

Jaime de Melo and Jean-Marc Solleder (2020), "Barriers to trade in environmental goods: How important are they and what should developing countries expect from theier removal," World Development 130, 1-11.

What is the EGS industry?

- Young & fast-growing
- Big in revenue
- Highly segmented
- Increasingly global
- Oligopoly, with a competitive fringe
- Big in employment
- Policy-driven
- Innovative

- **R&D** (per firm on average) = **3% of total revenue**
- **5-8% of all patents** in 2009

A personal conjecture

What we are seeing is not Schumpeterian innovation (i.e. creative destruction), but rather ***Smithian innovation****.*

Over the last decades, the combination of economic growth (or the overall expansion of markets) and more stringent environmental policies have led polluting firms to increasingly outsource the delivery of EGS to **specialized** enterprises.

The generic benefits of such **enhanced division of labor** are well-known since Adam Smith: it leads to managers focusing better on their core business, ever greater expertise, an ensuing **propensity to innovate**, and greater productivity (to which one may add economies of scale, higher-powered incentives, and more efficient risk sharing).

What is the EGS in

- Young & fast-growing
- Big in revenue
- Highly segmented
- Increasingly global
- Oligopoly, with a competitive fringe
- Big in employment
- Policy-driven
- Innovative
- A frequent target of industrial policy

Table 2
Review coverage showing selected countries, official export (credit/promotion) agencies, and accessed reports.

	General export promotion initiatives		Specific initiatives for environmental technology exporters
Country	Export credit agency(ies) and websites	Export promotion agency(ies) and websites	Reports
Austria	Oesterreichische Kontrollbank AG (OeKB)	Austrian Federal Economic Chamber	The Austrian Government, 2005. MUT Master Plan

Figure 7: Environmental Technologies Export Promotion Process

US Department of Commerce, *2019 Top Markets Report Environmental Technologies - A Market Assessment Tool for U.S. Exporters*, April 2020

Wisdom Kanda, Olof Hjelm and Santiago Mejía-Dugand (2015), "Promoting the export of environmental technologies: An analysis of governmental initiatives from eight countries," *Environmental Development* 17, 73-87.

How can international trade contribute to the development, adaptation and diffusion of EGS's?

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- Oligopoly, with a competitive fringe
- Big in employment
- Policy-driven
- Innovative
- A frequent target of industrial policy

Precise, **consensual** definitions and classifications

↓

More abundant, comparable and accessible data

On the data issue, see Céline Bak, "Growth, innovation and trade in environmental goods," Center for International Governance Innovation Policy Brief no. 67, Oct 2015

How can international trade contribute to the development, adaptation and diffusion of EGS's?

- Young & fast-growing
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- Big in employment
- **Policy-driven**
- **Innovative**
- A frequent target of industrial policy

Some caveats

- The outcome is likely to vary (a lot?) across industry segments.
- Who will really benefit from trade?
- **How will environmental policy adjust, and ultimately impact innovation?**

Smith-Stigler theorem

The division of labor (hence, Smithian innovation) is limited by **the extent of the market**.

Environmental policy's impact EGS international market

Barriers to exports

- **Inconsistent** environmental regulations might favor the status quo, by making difficult for local entrepreneurs to deploy , and thereby advertise, their new technology.

In this example, people tend to stick to using traditional (polluting) power generators, because the current regulations that protect riverbeds raise major administrative hurdles if one wants a green light to use instead a new (non-polluting) tidal turbine.

Barriers to imports

- Softer environmental policies

Alain-Désiré Nimubona, "Pollution policy and trade liberalization of environmental goods," *Environmental and Resource Economics* 53(3), 323-346.

Solveig Delabroye, Alain-Désiré Nimubona and Bernard Sinclair-Desgagné (2017), "International trade and the environmental goods and services industry," chapter 12 in *The WSPC Reference on Natural Resources and Environmental Policy in the Era of Global Change – Volume I: Game Theory* (Ana Espinola-Arredondo & Felix Munoz-Garcia, eds.), World Scientific.

- Too stringent environmental policies { **The price-elasticity effect**

Carl Gaigné and Lota D. Tamini (2021), "Environmental taxation and import demand for environmental goods: theory and evidence from the European Union," *Environmental and Resource Economics* 78: 307-352.

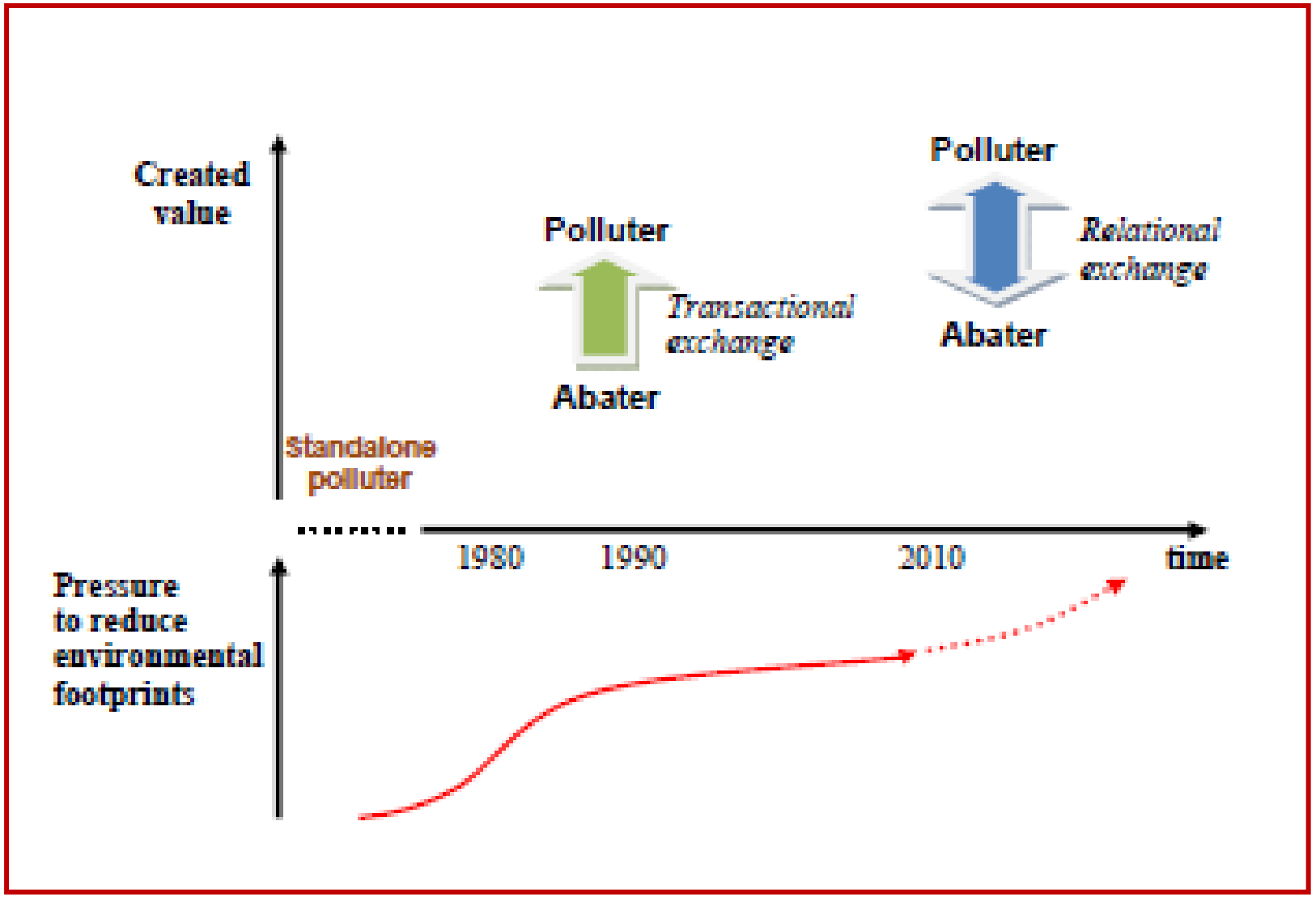
Environmental policy's impact on EGS innovation

Environmental companies must no longer subsist predominantly on short-term pollution control or waste management 'fix-its' in response to regulatory drivers. ***They must provide enduring value*** *through long-term, resource-oriented solutions to environmental unsustainability in anticipation of return on investment and long-term competitive advantage. (...)*

Pollution control, waste management and cleanup driven by regulation still represent the majority of revenues in the environmental industry. However, customer demand is replacing these services with pollution prevention and resource recovery investments not wholly dependent on regulations. (…)Expenditures on waste management equipment manufactured for containment, collection and transportation of solid waste for efficient disposal are increasingly being replaced by investments in equipment for sorting, processing and baling materials for recovery. (…) Demand for compliance-oriented consulting is drying up, while ***demand for strategic environmental management*** *and pollution prevention goes unmet.*

[From Environmental Business International *EBI Report 2020*, p. 33-34 of chapter 1]

Environmental policy's impact on EGS innovation



How can EGS’s contribute to international trade?

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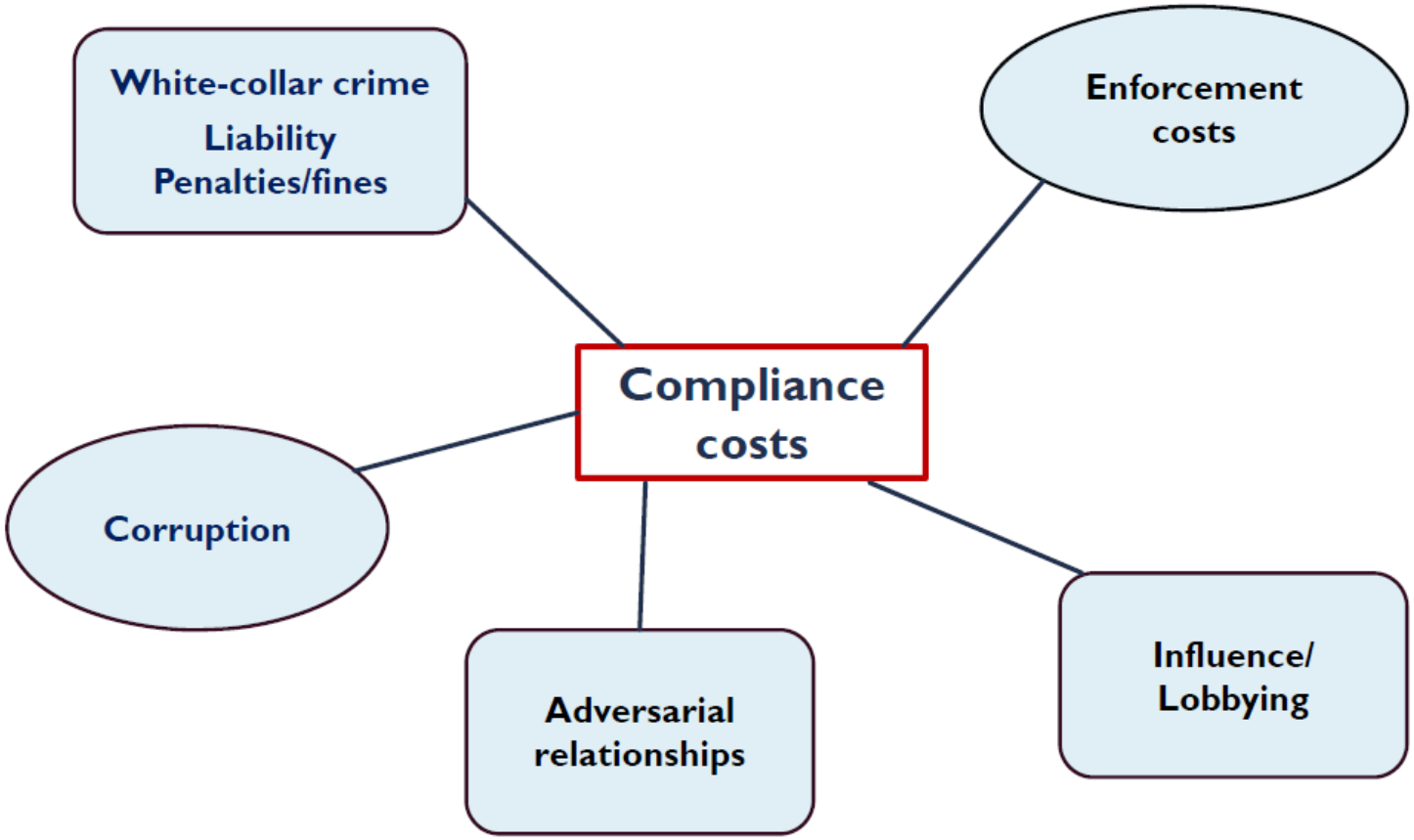
Potential benefits

- Greener global value chains
- Lower compliance costs



How can EGS's contribute to international trade?

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- Enhanced trade acceptability
  - Greater public health
  - Less race to the bottom

Illustration by Alexandre Magnin - Sustainabilityillustrated.com

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Potential benefits

- Greener global value chains
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Pitfalls

- Trade imbalances
- Browner global value chains
  - More trade in waste
  - Softer environmental regulation
- Social problems
  - Unemployment
  - Environmental justice

Thank you for listening!

Questions and remarks
are most welcome.