14th AISDRC
Track 6 "Regional Sustainable Development"
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a Decision Support System for Regional Sustainable Development

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"GDP measures everything…

- *… except that which makes life worthwhile*".
  - Robert F. Kennedy, speech at the University of Kansas, March 18, 1968 (Glaser Foundation – Measuring Progress, www.glaserfoundation.org)

Gross Domestic Product (GDP)

- **GDP was introduced in 1930s in US following the Great Depression**
  - gross total of the market value of all final goods and services produced within a country in a given period of time
  - to help politicians in steering the economy towards key economic objectives and provide a solid basis to address economic policy decisions.
- **Today GDP has become the foremost measure of economic activity, universally recognised and accepted**
  - it allows us to track the economic developments over an extended period of time and to compare the economic performance of different countries worldwide

…but nowadays GDP is also"misused"

as an indicator of the well-being of the societies

GDP & Development

- "*Distinctions must be kept in mind between quantity and quality of growth, between its costs and returns, and between the short and the long run. […] Goals for 'more' growth should specify more growth of what and for what*".
  - Simon Kuznets, 1962

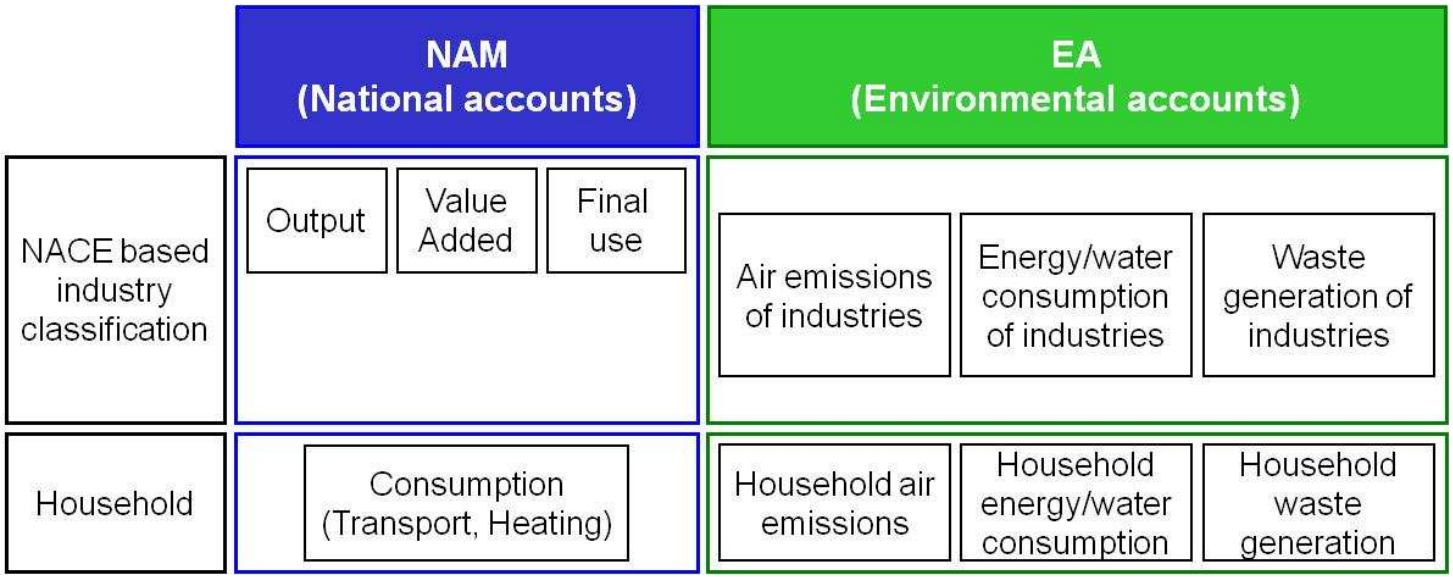
?

- **We need comprehensive tools to complement GDP**
  - and to go beyond conventional economic indicators, which are not sufficient to cover sustainable development issues.

What is NAMEA?

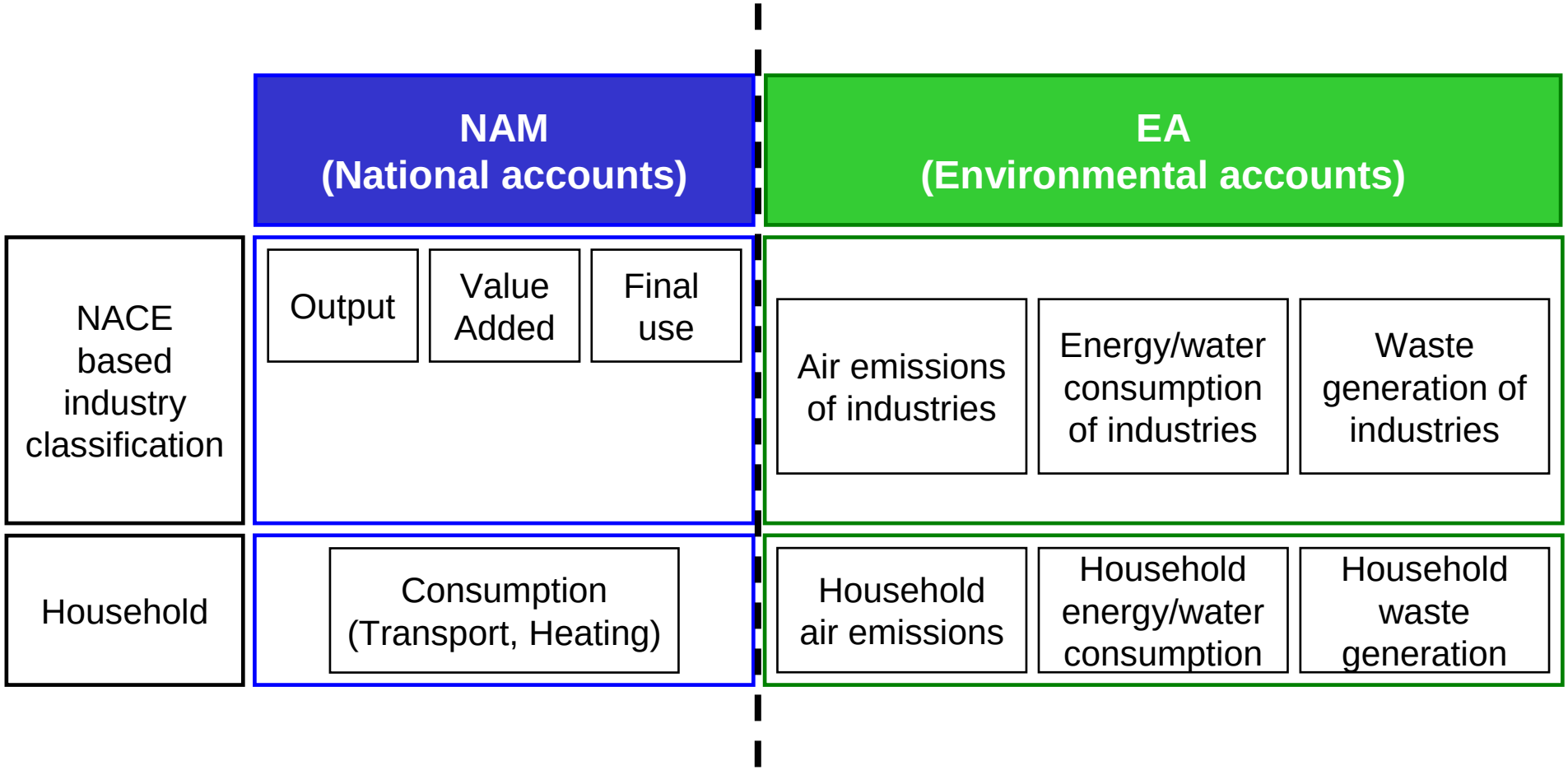
- **NAMEA is a National Accounting Matrix including Environmental Accounts**
  - derived from the analysis of "physical economy" by Leontief (1970)
  - developed by Statistics Netherlands (CBS) in the 1990s
  - recognised of top priority by EC "Communication COM (94) 670
  - standardised by Eurostat "NAMEA for air emissions – Compilation Guide"

- **NAMEA is a statistical information system in a matrix form**



NAMEA simplified scheme

- **Eurostat (2007) NAMEA for Air Emissions - Compilation Guide**



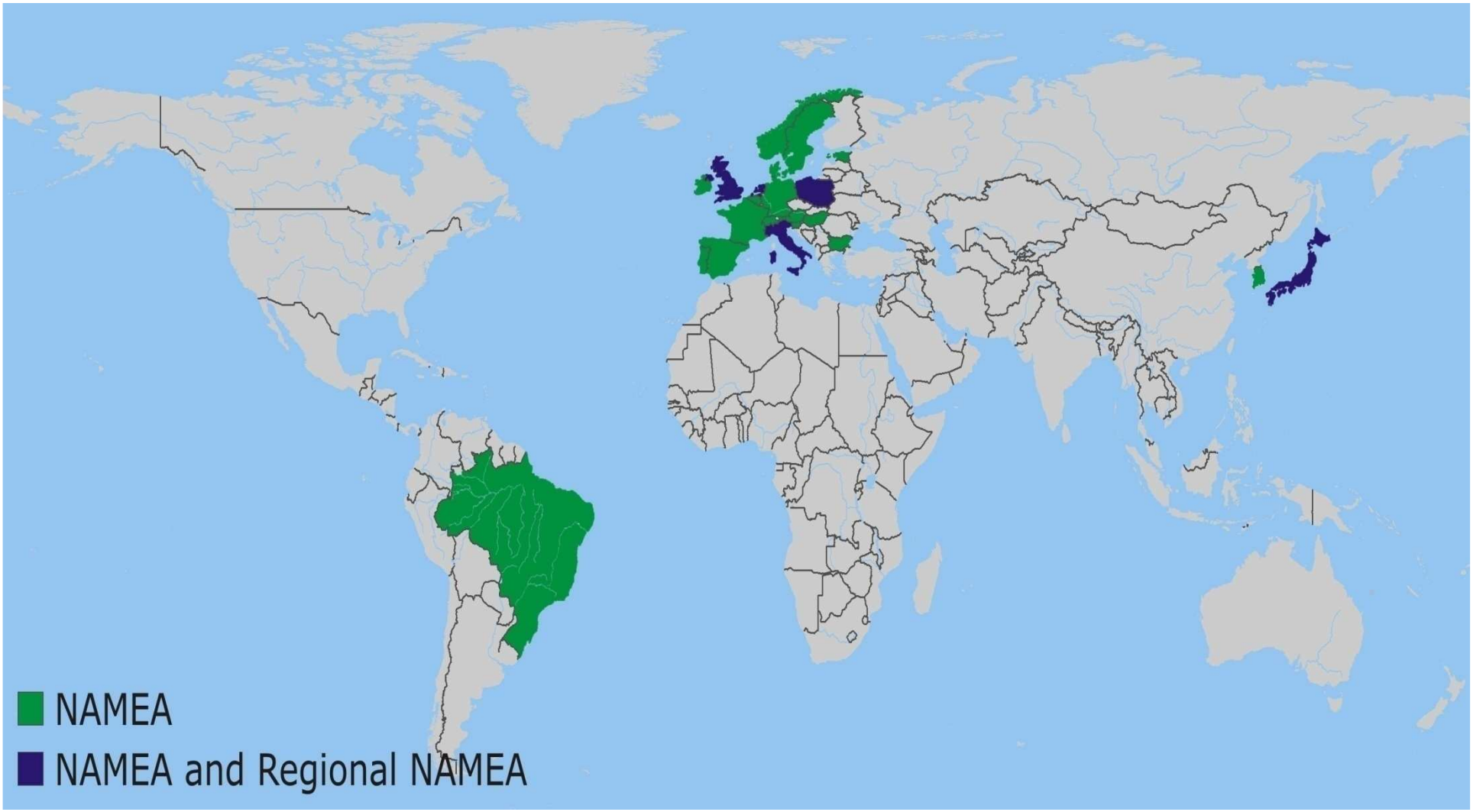
NAMEA as a Decision Support System

- **NAMEA for monitoring**
  - **pressures** placed on the environment by the economic sectors and households
  - "**hot spots**" in terms of environmental pressures & economic performances
  - **eco-efficiency indexes** (e.g. intensity of emission)

- **NAMEA for forecasting**
  - scenario analysis to evaluate and quantify the effects of different policies/strategies (e.g. aiming to the reduction of emissions)

- **NAMEA for benchmarking**
  - between countries/regions (if Regional NAMEA is developed)
  - **descriptive statistical and shift-share analysis**

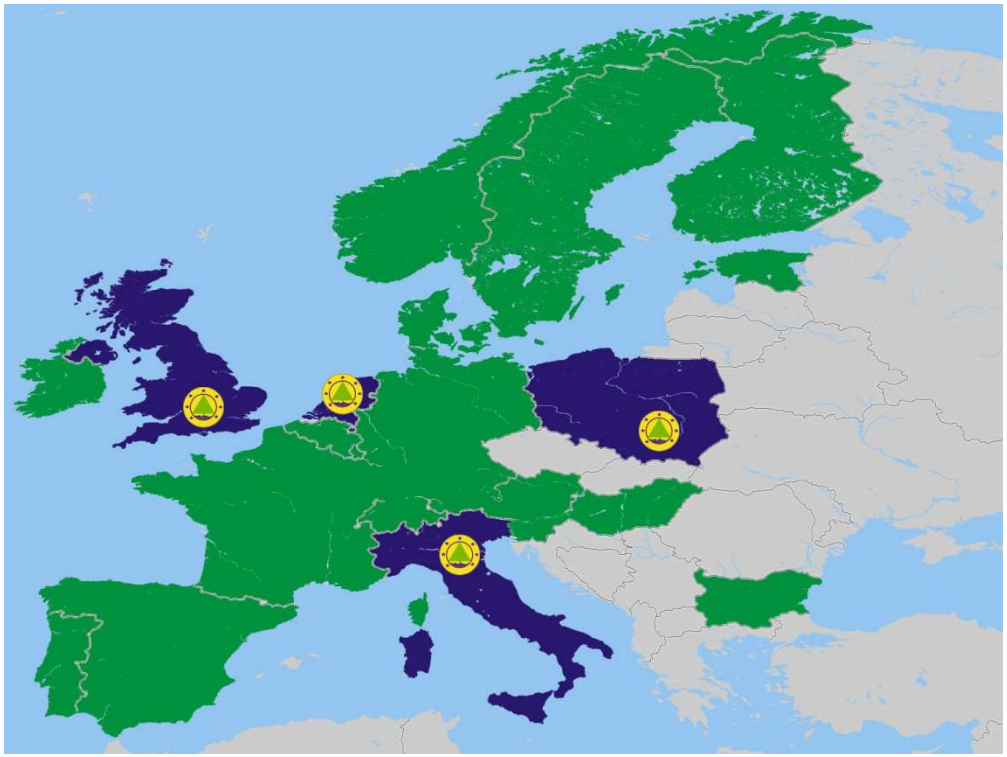
International application of NAMEA



RAMEA project

- **Interreg IIIC GROW project (4 regions, 7 institutes)**
  - Emilia-Romagna (IT)
  - Malopolska (PL)
  - Noord-Brabant (NL)
  - South-East England (UK)
- **Develop "R**egional n**AMEA"**
  - official statistics data
  - internationally accepted methodology
  - standardized systems
  - coherency with NAMEA tools
- **Support for regional policies**
  - understand economic-environmental performances
  - inform policies/strategies about Sustainable Development

- **EU Commission reaction**
  - RAMEA invited to EU Open Days 2008 (www.opendays.europa.eu)



Overview of Emilia-Romagna region (Italy)

- **Economy and Society**
  - 4205400 inhabitants, 22117 km^2, 193.7 inhab/km^2
  - GDP 128.1% (EU-27=100%), the 3rd richest region in Italy
  - Unemployment rate 3.4%
  - Key sectors: Agriculture and Food Industry, Mechanical and Automotive, Ceramic, Tourism

- **Environment: urgent questions**
  - GHG emissions
  - PM and NO_X emissions, Ozone
  - Water scarcity (summer)
  - Hydrogeological risk and coastal erosion
  - Subsidence
  - Urban sprawl

RAMEA in Emilia-Romagna (%)

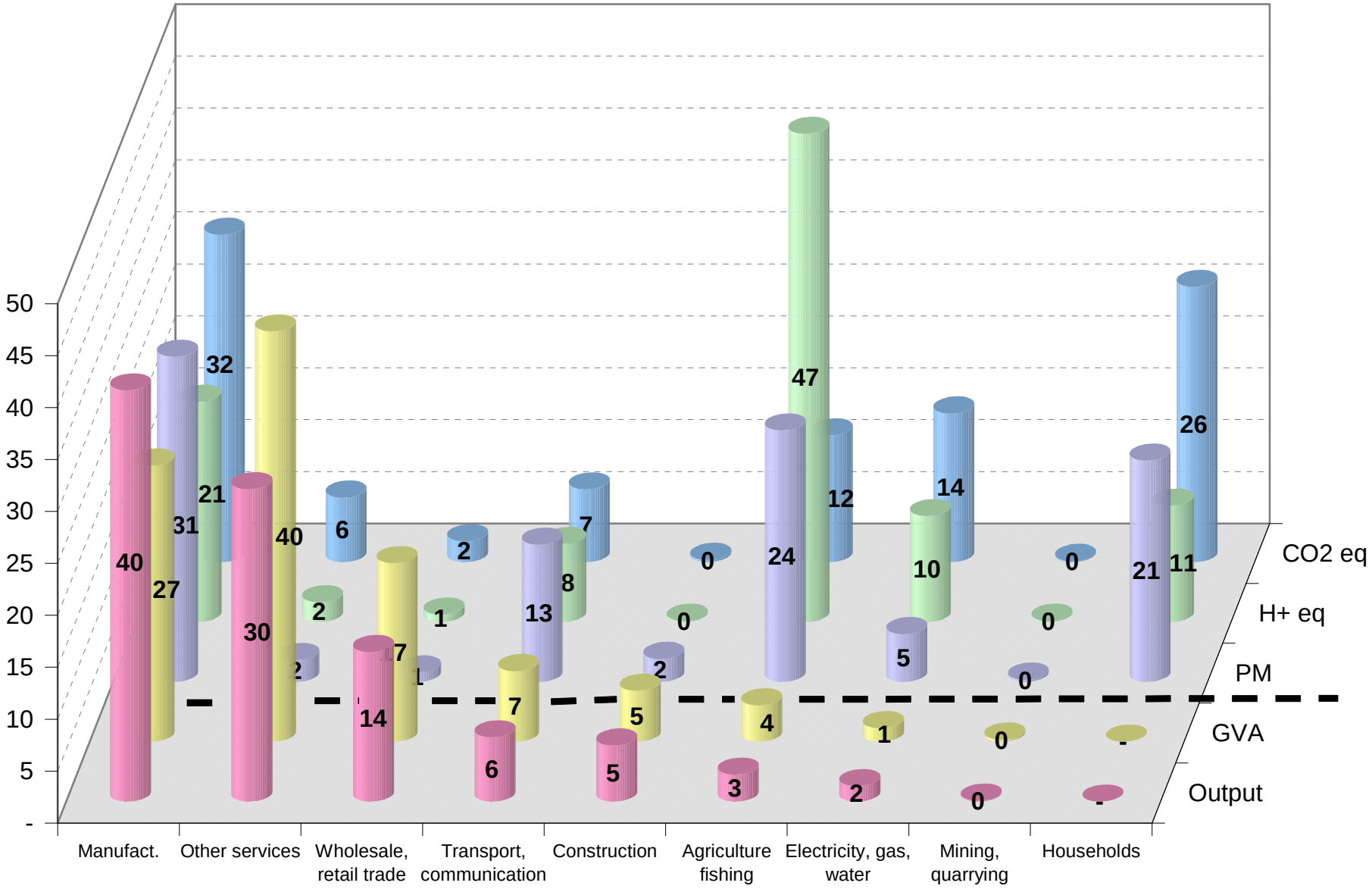
- 3 years: 1995, **2000**, 2003
- 33 economic sectors (30 industries + 3 households)
- Output, GVA, Final Consumption, Employment
- 21 air emissions (GHG, Acidification, Local Air quality, …)
- I/O tables

		RAM			EA				
		Economic aggregates			GHG	Acidif.	Local air quality		
NACE (COICOP)	Sectors	Output	GVA	Final Cons.	CO2 eq	H+ eq	PM	NMVOC	CO
A, B	Agriculture and fishing	2.6	3.5	-	12.2	47.0	24.2	4.6	9.8
C	Mining and quarrying	0.1	0.2	-	0.1	0.1	0.2	0.2	0.0
D	Manufacturing activities	39.6	26.6	-	31.5	21.2	31.3	30.7	2.4
E	Electricity, gas and water supply	1.5	1.3	-	14.3	10.2	4.6	3.2	0.5
F	Construction	5.4	4.9	-	0.2	0.1	2.2	3.9	0.1
G, H	Wholesale and retail trade	14.4	17.2	-	2.0	0.7	0.9	1.7	0.5
I	Transport and communication	6.2	6.8	-	7.0	7.5	13.2	6.9	5.6
J-Q	Other services	30.1	39.5	-	6.2	1.9	2.1	1.3	2.1
07	Private traffic	-	-	3.4	12.3	9.1	13.3	34.1	70.3
04	Heating, cooking, air cond	-	-	2.1	14.1	2.1	8.0	1.9	8.0
-	Other consumptions	-	-	94.6	0.1	0.0	-	11.4	0.7
	Economic activities	**100.0**	**100.0**	**-**	**73.5**	**88.8**	**78.7**	**52.6**	**21.0**
	Households	**-**	**-**	**100.0**	**26.5**	**11.2**	**21.3**	**47.4**	**79.0**
	Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

RAMEA in Malopolska (%)

		RAM			EA				
		Economic aggregates			GHG	Acidif.	Local air quality		
NACE (COICOP)	Sectors	Output	GVA	Final Cons.	CO2 eq	H+ eq	PM	NMVOC	CO
A, B	Agriculture and fishing	3.5	2.8	-	-	0.1	3.3	-	3.5
C	Mining and quarrying	0.9	1.0	-	0.2	-	2.6	-	2.7
D	Manufacturing activities	29.5	18.0	-	20.3	-	7.8	15.7	14.1
E	Electricity, gas and water supply	3.0	2.8	-	48.1	0.1	1.2	1.1	6.9
F	Construction	7.9	6.3	-	-	-	-	0.5	-
G, H	Wholesale and retail trade	20.5	23.7	-	-	-	-	-	-
I	Transport and communication	6.2	6.0	-	-	-	18.4	-	6.8
J-Q	Other services	28.7	39.3	-	0.2	-	49.4	0.1	7.3
07	Private traffic	-	-	8.8	17.3	41.2	-	17.4	7.7
04	Heating, cooking, air cond	-	-	10.3	13.9	58.5	17.3	65.3	50.8
-	Other consumptions	-	-	80.9	-	-	-	-	-
	Economic activities	**100.0**	**100.0**	**-**	**68.9**	**0.2**	**82.7**	**17.3**	**41.4**
	Households	**-**	**-**	**100.0**	**31.1**	**99.8**	**17.3**	**82.7**	**58.6**
	Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.**	**100.0**	**100.0**

Key sectors and "hot spots"



Indicator of Intensity = Pressure/Driver

Intensity of emission of Green House Gas (GHG)

X = Emissions / Value Added

(KTon CO_2eq. / Meuro)

the higher the indicator, the less eco-efficient the considered economic system or sector

By means of a Descriptive Statistical analysis we can make significant comparisons e.g.

- region with its country

$$\Delta = X_{\text{Emilia-Romagna}} - X_{\text{Italy}} = -0{,}072$$

Shift Share analysis

- **A statistical model applied to:**
  - territorial analysis
  - territorial planning
  - evaluation of economic impact of Policies

- **Going beyond the descriptive statistical comparison, Shift Share analysis explains the gap between regional and national indicators using three different effects:**

$$X_{E\text{-}R} - X_{Italy} = m_r + p_r + a_r$$

- **Each effect (m, p, a) can be investigated both for the whole economic system and for the economic sectors.**

Shift Share effects

INDUSTRY MIX *(m)* effect → Quantifies the part of Intensity of emission due to the sectorial productive structure of the economic system

DIFFERENTIAL *(p)* effect → Quantifies the contribute deriving from the sectorial efficiency of emissions

ALLOCATIVE *(a)* effect → Indicates if the system has a productive specialization in the sectors where it shows a comparative advantage in terms of efficiency (*covariance*)

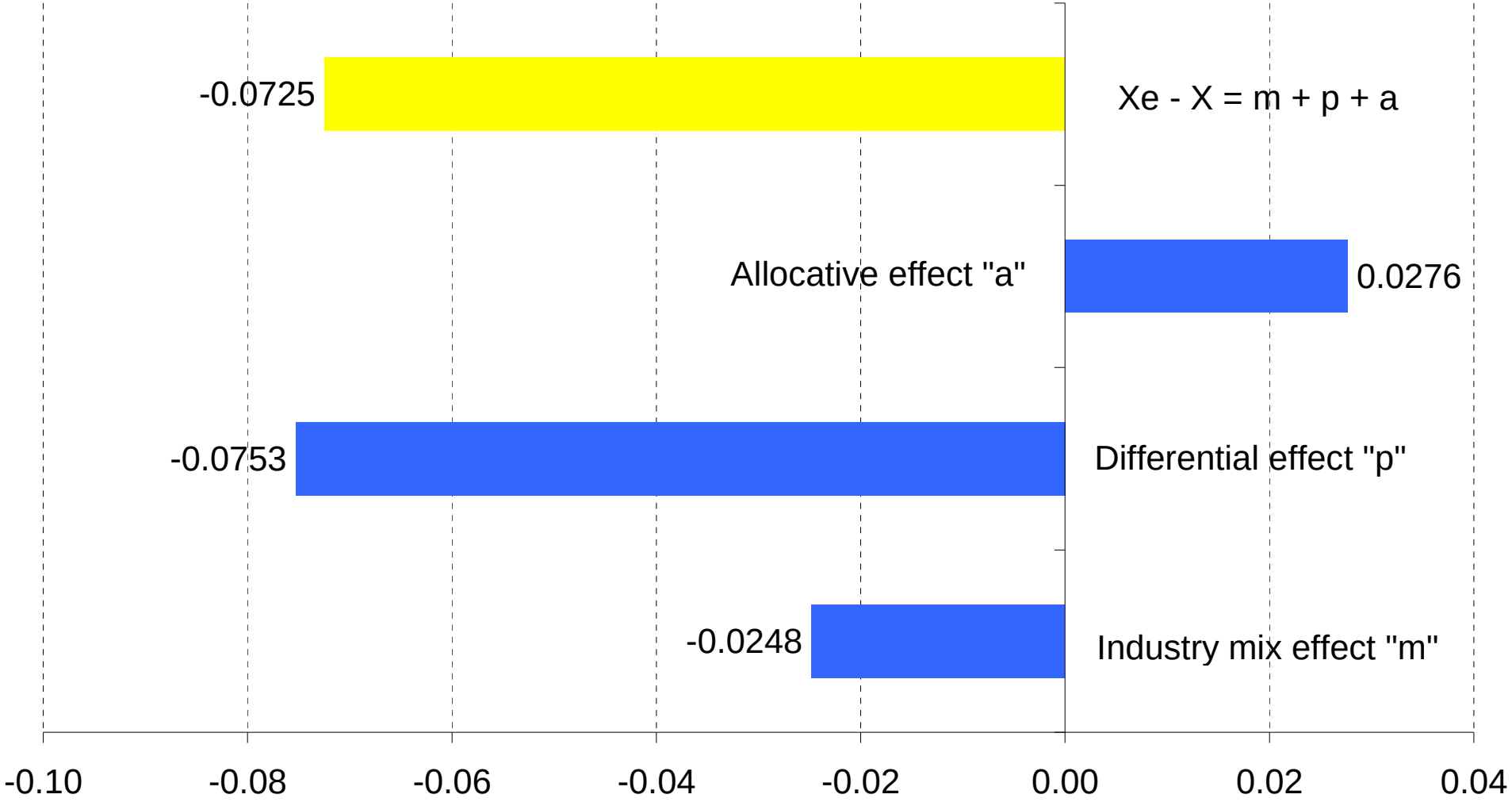
The higher the effects, the less eco-efficient the considered system or sector

$$X_{E\text{-}R} - X_{Italy} = m_{E\text{-}R} + p_{E\text{-}R} + a_{E\text{-}R} = -0.072$$

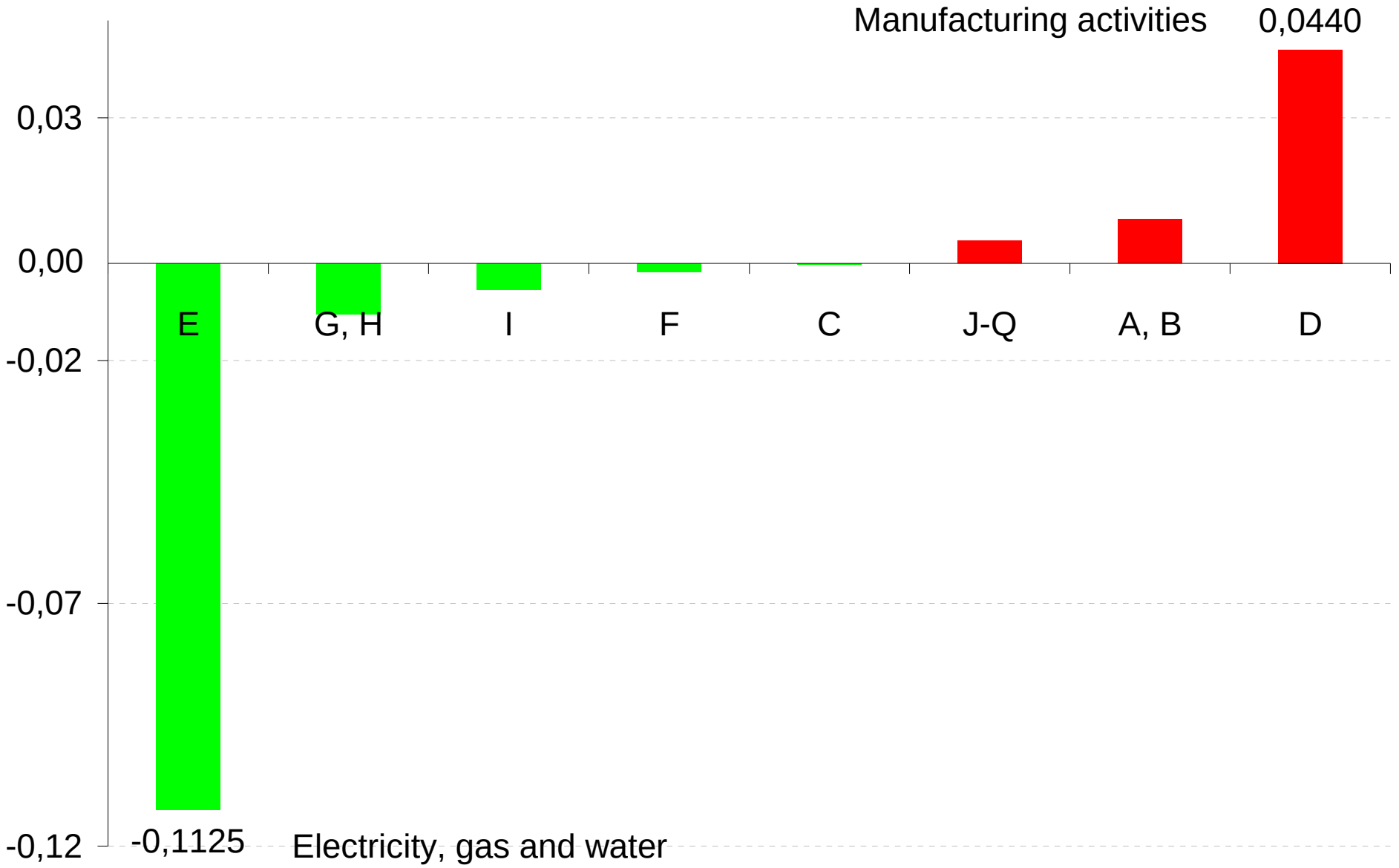
Where does this difference come from?

A combined statistical analysis (descriptive and Shift Share) can help us…

Shift Share (Emilia-Romagna / Italy)



Comparing regional and national sectors



Shift Share to support Decision Makers

From an in depth analysis on the mathematical signs of Shift Share effects

<u>useful suggestions for policy makers and sectorial policies can be derived</u>

If a higher value of Intensity of emission were only due to reasons of productive structure in terms of sectors (Industry mix effect “m”), an Environmental policy couldn’t have great direct influence, unlike **Development policy**

If a relative inefficiency were due to the specific environmental inefficiency of the sectors (differential effect “p”), caused by their technologies, an **Environmental policy** could have greater possibility of action

Shift Share Decision Support Matrix

m industry mix	p differential	a allocative (covariance)	Effects of Shift Share analysis and possible scenarios DSS matrix
-	-	-	Excellent combination: effective environmental policy in relation to the economic system
+	+	+	Joint implementation of environmental and sectorial policies recommended
+	-	-	Development policies to promote and further improve eco-efficient sectors
-	-	+	Further SS of the sub-sectors to understand which are the more negative impacting fields
-	+	-	The sector could be the object of a strong Environmental Policy that tries to improve specific technologies of the sector
-	+	+	Making a further SS to understand the features of the sub-sectors. Act on Environmental Policies, to make the sectorial technologies cleaner and reduce the Intensity of emission

Opportunities for the future

- **Reporting and Environmental Assessment**
  - "Regional State of the Environment" reports
  - Environmental Assessment of Regional Plans and Programmes
  - Allocation of European Structural Funds in Operational Programs

- **Adding new environmental and social themes**
  - simple score indicators (for communication purposes, i.e. Eco-footprint)
  - energy/electricity consumption, waste production, water, land use…
  - exploring the potential for adding social theme

- **Benchmarking and new cooperation projects**
  - to become aware of our strengths and weaknesses in comparison to other regions/tools

Regional scale for Sustainable Policies

- GDP has limits in covering SD issues
- NAMEA can go beyond GDP limits
- but Regional scale for economic-environmental accounting has a crucial role in building a pathway to SD

We need to think globally… but it's time to act locally!

(United Nations Conference on the Human Environment, Stockholm - Sweden, 1972)

Thank you for your attention!

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