

# Measuring Sustainable Resource Use of Companies Beyond Eco-Efficiency

Presentation at the

**1<sup>st</sup> Conference of AERNA**

June 18-19, 2004, Vigo (E)

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Frank Figge gratefully acknowledges funding from the School of the Environment/University of Leeds.  
Tobias Hahn gratefully acknowledges funding from the German Federal Ministry for Education and Research.

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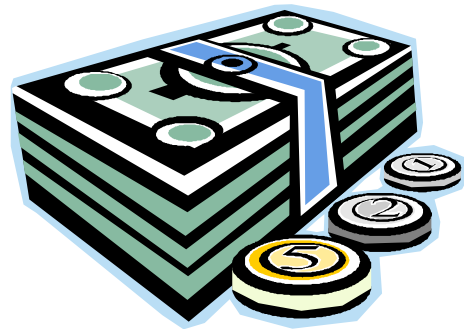
Institute for Futures Studies and Technology Assessment

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# Eco-Efficiency: The big buzz-word

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CO<sub>2</sub>

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# The Burden-Based Approach

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- What's a company's overall damage to society?
- Weigh up different „environmental bads“
  - How bad is more CO<sub>2</sub> in comparison to all the other impacts?
  - What's e.g. the trade-off between work accidents and CO<sub>2</sub>?
- It's
  - Focused on how bad emissions are.
  - Ethically doubtful.
  - Impossible in practice for many impacts.
  - Unimportant.

# The Value-Based Approach

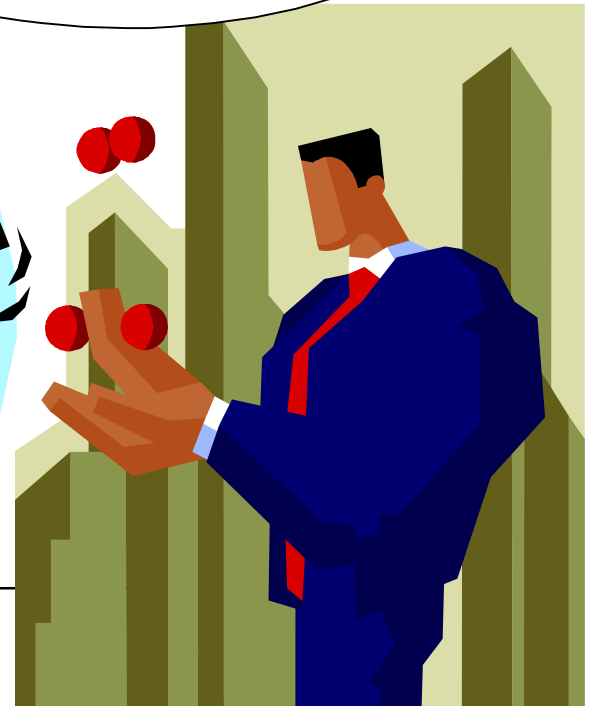
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- How much value is created?
  - How much € value is created per ton of CO<sub>2</sub>?
  - How much € value is created per ton of VOC?
- Compare the value of alternative uses (opportunity costs)
  - When used in another place – how much more value is created?
- It's
  - Focused on how much value is created.
  - Easy to do.
  - Using the logic of the financial markets.
  - Compatible with managerial thinking.

# How to deal with environmental damage?

I want to pollute more! How much do I have to pay you to accept the additional damage?

I want to pollute more! How much do I have to pay you to pollute instead of you?



# The Fundamental Difference Between Value-based and Burden-based Approaches.

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- Burden-based approaches...
  - ... assess resource use according to the burden that is caused.
  - ... focus on the relative harmfulness of environmental impacts.
- Value-based approaches...
  - ... assess the use of resources according to the effect on value creation.
  - ... focus on opportunity cost of resource use.
- Both approaches are necessary for optimal resource use.

# The Value-Based Concept Can Answer Two Questions.

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- A company has reduced some impacts and increased other impacts. Has it contributed to more sustainability?
  - Sustainable Value Added
- A company is using a given bundle of economic, environmental and social resources. Is it contributing to sustainability?
  - Sustainable Value

# Sustainable Value Added.

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In 2002, Repsol YPF have saved 1,975,000 tons of CO<sub>2</sub>.  
What is the value of that?

# Here's what we know about Repsol's effectiveness in 2002.

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- Some good news...
  - ☺ – 1,975,000 tons of CO<sub>2</sub> emissions than in 2001.
  - ☺ – 6,782 tons of SO<sub>2</sub> emissions than in 2001.
  - ☺ – 13,561 tons of VOC emissions than in 2001.
  - ☺ – 1,237 tons of CO emissions than in 2001.
  - ☺ – 300 tons of N<sub>2</sub>O emissions than in 2001.
  - ☺ – 138,706 tons of hazardous waste than in 2001.
- ...and some bad news
  - ☹ + 17,289 tons of CH<sub>4</sub> emissions than in 2001.
  - ☹ + 5,123 tons of NO<sub>x</sub> emissions than in 2001.
  - ☹ + 10,853 m<sup>3</sup> water consumption than in 2001.
  - ☹ – 2.168 billion € Value Added than in 2001

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Sources: Repsol YPF Environmental Report 2001 and 2002, Repsol Annual Reprt 2001 and 2002.

# How do multiple impacts add up?

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- Companies need several environmental and social resources to create value.
  - Impacts are complementary.
  - Companies use bundles of environmental and social resources to create value.
- We know e.g. that in the Spanish economy in 2002
  - 1 ton of SO<sub>2</sub> goes with
  - 165 tons of CO<sub>2</sub>to create value.
- This relationship is what we use to account for the complementary character of impacts.
  - ➔ Resources are weighted by their contribution to value creation on the national economy level.

# Sustainable Value Added of Repsol YPF in 2002.

	Change in resource use 2001 - 2002	Efficiency of Spanish National Economy [€/unit]	Value Contribution
CO2-Emissions [t]	-1.975.000 *	1.837,08 =	3.628.231.017,54 €
CH4-Emissions [t]	17.289 *	305.214,79 =	-5.276.858.559,20 €
N2O-Emissions [t]	-300 *	6.445.436,23 =	1.933.630.870,33 €
NOx-Emissions [t]	5.123 *	309.884,19 =	-1.587.536.725,26 €
CO-Emissions [t]	-1.237 *	217.537,96 =	269.094.456,01 €
NMVOC-Emissions [t]	-13.561 *	248.655,18 =	3.372.012.862,86 €
SO2-Emissions [t]	-6.782 *	303.863,52 =	2.060.802.418,15 €
Hazardous waste [t]	-138.706 *	434.408,19 =	60.255.023.045,20 €
Water used [m <sup>3</sup> ]	10.853 *	106,65 =	-1.157.483,08 €
Overall environmental and social performance			7.183.693.544,73 €
Economic growth			-2.168.000.000,00 €
<b>Sustainable Value Added of Repsol YPF in 2002</b>			<b>5.015.693.544,73 €</b>

Sources: Repsol YPF Environmental Report 2001 and 2002, Repsol Annual Reprt 2001 and 2002, Statistical Yearbook Spain 2003, National IPCC GHG Inventory 2002, own caluculations.

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# Sustainable Value.

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In 2002, Repsol YPF was more water-efficient than the Spanish economy.  
What is the value of that?

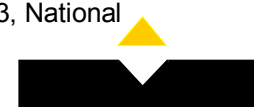
# Comparison of Efficiencies between Repsol YPF and Spain.

Environmental Resource	Efficiency of Repsol YPF [€/unit]	Efficiency of Spanish national economy [€/unit]	Comparison
CO2-Emissions [t]	236,00	1.837,08	
CH4-Emissions [t]	72.517,91	305.214,79	
N2O-Emissions [t]	2.802.500,00	6.445.436,23	
NOx-Emissions [t]	48.073,93	309.884,19	
CO-Emissions [t]	158.933,82	217.537,96	
NMVOC-Emissions [t]	71.227,74	248.655,18	
SO2-Emissions [t]	38.424,30	303.863,52	
Hazardous waste [t]	15.978,45	434.408,19	
Water used [m <sup>3</sup> ]	33.130,88	106,65	

Sources: Repsol YPF Environmental Report 2002, Repsol Annual Reprt 2002, Statistical Yearbook Spain 2003, National IPCC GHG Inventory 2002, own caluculations.

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# Sustainable Value of Repsol YPF in 2002.

	Amount of resources used	Efficiency of Repsol YPF [€/unit]	Efficiency of Spain [€/unit]	Value Contribution
CO2-Emissions [t]	19.000.000 *	( 236,00 -	1.837,08 ) =	-30.420.500.928,27 €
CH4-Emissions [t]	61.833 *	( 72.517,91 -	305.214,79 ) =	-14.388.346.306,39 €
N2O-Emissions [t]	1.600 *	( 2.802.500,00 -	6.445.436,23 ) =	-5.828.697.975,07 €
NOx-Emissions [t]	93.273 *	( 48.073,93 -	309.884,19 ) =	-24.419.828.416,07 €
CO-Emissions [t]	28.213 *	( 158.933,82 -	217.537,96 ) =	-1.653.398.453,94 €
NMVOE-Emissions [t]	62.953 *	( 71.227,74 -	248.655,18 ) =	-11.169.589.392,78 €
SO2-Emissions [t]	116.697 *	( 38.424,30 -	303.863,52 ) =	-30.975.961.632,46 €
Hazardous waste [t]	280.628 *	( 15.978,45 -	434.408,19 ) =	-117.423.102.844,35 €
Water used [m³]	135.342 *	( 33.130,88 -	106,65 ) =	4.469.565.643,14 €
<b>Sustainable Value of Repsol YPF in 2002</b>				<b>-25.756.651.145,13 €</b>

Sources: Repsol YPF Environmental Report 2002, Repsol Annual Reprt 2002, Statistical Yearbook Spain 2003, National IPCC GHG Inventory 2002, own caluculations.

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# Conclusions

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- The value-based approaches
  - express companies' sustainable resource use in € terms.
  - demonstrate Repsol YPF's contribution to making Spain more sustainable.
    - Sustainable Value Added
  - show whether Repsol YPF's uses its resources more sustainably or less sustainably than other Spanish companies.
    - Sustainable Value
- Advantages of the approach:
  - It leaves overall environmental and social burden constant.
  - It is based on data which is publicly available.
  - It does not require external cost figures.
  - It provides a basis for meaningful but understandable measurement of sustainable resource use.

# More information

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## **Suggested Reading:**

Figge, F. & Hahn, T. (2004): "Sustainable Value Added. Measuring Corporate Contributions to Sustainability Beyond Eco-Efficiency", *Ecological Economics*, 48(2), 173-187.

Figge, F. & Hahn, T. (2004): "Sustainable Value Added - Ein neues Maß des Nachhaltigkeitsbeitrags von Unternehmen am Beispiel der Henkel KGaA", *Vierteljahreshefte zur Wirtschaftsforschung*, 73(1), 126-141.