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Corporate Carbon Disclosure Consistency: Can Companies Add Up CO2e Emissions?

Presentation at JRC Summer School

Panel: Sustainable finance: disclosures, data and usability challenges

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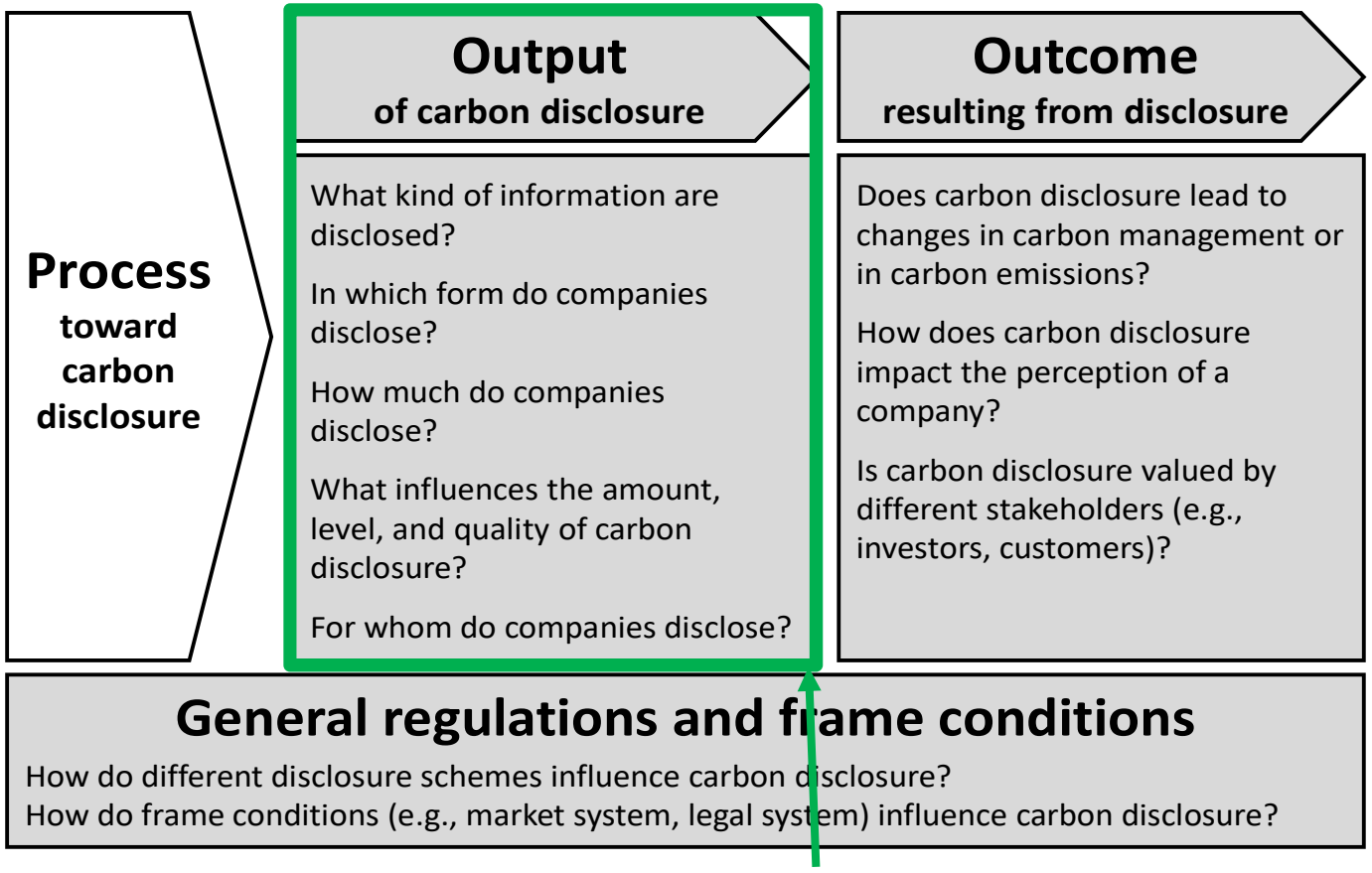
Research Framework – Carbon Disclosure



Use case for disclosure quality: Carbon disclosure via CDP

„CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts." (cdp.net)

How it works:

- CDP sends questionnaires to companies every year.
- Questions aim at carbon management practices, climate-related risks and risk management, and carbon emissions (including targets).
- More than 2,000 companies provide answers to the climate questionnaire.

Participation is voluntary:

- Companies can answer the questionnaire and choose to not make answers public
- Companies can choose, which questions they answer (and which not)
- But: in the questionnaire structure it becomes clear, which questions were not answered by a company

CDP is perceived as high quality

Reporting carbon emissions breakdowns via CDP

When reporting their Global Scope 1 and Scope 2 greenhouse gas emissions (GHG) to the CDP, companies are encouraged to also voluntarily report their total GHG emissions broken down into

(i) Activities,

(ii) Business Units,

(iii) Facilities,

(iv) GHG types and

(v) Regions

Reporting carbon emissions breakdowns via CDP

If companies had a suitable software or just an accurate Excel sheet for their voluntary GHG breakdown reporting, the equation 1 should hold:

Reported Global Emissions = Sum of Breakdown

If companies struggled with a suitable software or an accurate Excel sheet but followed the Precautionary Principle ('If in doubt, err on the side of the planet not on the side of the company') as required by the EU's Paris Aligned Benchmarks for their voluntary GHG breakdown reporting, the equation 2 should hold:

Reported Global Emissions ≥ Sum of Breakdown

We investigate whether equation 1 and 2 hold in the entire CDP database between 2010 and 2019 (N > 18,000 firm year reports) for

- all 5 breakdowns in Scope 1
- all 4 available breakdowns on Scope 2 (GHG types not available)

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Test 1: CDP Scope 1

Equation 1: Reported Global Emissions = Sum of Breakdown

		CDP Report										Total	Average
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Activity	Mismatch		53	61	44	78	88	84	103	54	48	613	68.1
	Percentage (preprocessed)		18.7	16.9	10.8	16.9	17.4	15.7	17.8	11.1	9.3		15.0
	Total Reports (preprocessed)		283	362	406	461	505	534	580	486	514		459.0
	Total Reports (raw)		339	434	480	544	592	624	680	577	591		540.1
Business	Mismatch	98	94	58	74	123	114	122	109	84	89	965	96.5
	Percentage (preprocessed)	20.0	19.5	11.0	13.2	21.8	19.6	20.2	17.8	15.8	15.4		17.4
	Total Reports (preprocessed)	491	483	529	562	563	582	605	611	530	577		553.3
	Total Reports (raw)	596	584	634	670	677	698	727	740	647	687		666.0
Facility	Mismatch	91	92	77	77	94	99	98	101	55	71	855	85.5
	Percentage (preprocessed)	28.7	29.9	21.9	23.2	29.0	28.2	26.1	24.8	18.6	22.9		25.3
	Total Reports (preprocessed)	317	308	351	332	324	351	375	408	296	310		337.2
	Total Reports (raw)	365	361	410	379	372	405	428	468	341	348		387.7
GHG	Mismatch	237	137	128	106	173	156	166	172	206	192	1673	167.3
	Percentage (preprocessed)	34.4	27.7	25.5	21.4	32.4	28.5	29.4	30.6	26.7	23.7		28.0
	Total Reports (preprocessed)	689	494	502	496	534	547	565	563	771	811		597.2
	Total Reports (raw)	833	581	591	583	625	636	655	665	924	933		702.6
Region	Mismatch	115	145	94	127	169	196	206	201	135	134	1522	152.2
	Percentage (preprocessed)	13.9	18.3	11.0	14.0	18.2	20.2	20.1	18.8	12.2	11.8		15.8
	Total Reports (preprocessed)	826	792	858	907	929	972	1026	1071	1104	1133		961.8
	Total Reports (raw)	987	936	1001	1061	1103	1152	1212	1259	1312	1314		1133.7
Total Mismatches		541	521	418	428	637	653	676	686	534	534	**5628**	
Total Organisations (preprocessed)		**1013**	**1097**	**1227**	**1297**	**1340**	**1408**	**1480**	**1539**	**1119**	**1141**	12661	1266.1
Total Organisations (raw)		**1228**	**1309**	**1457**	**1532**	**1592**	**1670**	**1744**	**1812**	**1327**	**1323**	14994	1499.4
*Number Mismatch Orgs		373	340	296	283	426	435	443	443	360	358	3757	375.7
*Percentage Mismatch Orgs (preprocessed)		**36.8**	**31.0**	**24.1**	**21.8**	**31.8**	**30.9**	**29.9**	**28.8**	**32.2**	**31.4**		29.9

*Number Mismatch Orgs: organisation appears at LEAST one time in the breakdowns

Preprocessing:

1. Reported periods of previous CDP reports were not considered, e.g., the following ranges were considered for 2010 , 2011, and 2019:
   - 2010: **From** 01 January 2009 **To** 31 December 2010
   - 2011: **From** 01 January 2010 **To** 31 December 2011
   - 2019: **From** 01 January 2018 **To** 31 December 2019
2. Only **numeric** values were considered, i.e., values like "Null" or "N/A" were not added to the total sum on each breakdown.

Raw: Original data provided by CDP on each breakdown, i.e., overlapped periods and values such as "Null" and "N/A" were considered as "Total" reports.

Test 1: CDP Scope 1

Reported Global Emissions = Sum of Breakdown

Average Percentage of Mismatch (2010-2019) by region

30 Worst Countries

Region

EU Countries	Non-EU Countries
32.4	40.4
17.3	11.4

Country/Region
Average Reported (2010-2019)
Average Percentage of Mismatch (2010-2019)

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Test 2: CDP Scope 1

Equation 2: Reported Global Emissions ≥ Sum of Breakdown

		CDP Report										Total	Average
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Activity	Mismatch		14	22	17	31	39	47	49	20	20	259	28.8
	Percentage (preprocessed)		4.9	6.1	4.2	6.7	7.7	8.8	8.4	4.1	3.9		6.1
	Total Reports (preprocessed)		283	362	406	461	505	534	580	486	514		459.0
	Total Reports (raw)		339	434	480	544	592	624	680	577	591		540.1
Business	Mismatch	35	36	8	29	53	57	43	50	34	22	367	36.7
	Percentage (preprocessed)	7.1	7.5	1.5	5.2	9.4	9.8	7.1	8.2	6.4	3.8		6.6
	Total Reports (preprocessed)	491	483	529	562	563	582	605	611	530	577		553.3
	Total Reports (raw)	596	584	634	670	677	698	727	740	647	687		666.0
Facility	Mismatch	17	21	17	17	28	24	28	25	7	20	204	20.4
	Percentage (preprocessed)	5.4	6.8	4.8	5.1	8.6	6.8	7.5	6.1	2.4	6.5		6.0
	Total Reports (preprocessed)	317	308	351	332	324	351	375	408	296	310		337.2
	Total Reports (raw)	365	361	410	379	372	405	428	468	341	348		387.7
GHG	Mismatch	90	57	51	41	68	53	65	75	49	50	599	**59.9**
	Percentage (preprocessed)	13.1	11.5	10.2	8.3	12.7	9.7	11.5	13.3	6.4	6.2		10.3
	Total Reports (preprocessed)	689	494	502	496	534	547	565	563	771	811		597.2
	Total Reports (raw)	833	581	591	583	625	636	655	665	924	933		702.6
Region	Mismatch	42	60	15	45	69	77	85	101	53	41	588	58.8
	Percentage (preprocessed)	5.1	7.6	1.7	5.0	7.4	7.9	8.3	9.4	4.8	3.6		6.1
	Total Reports (preprocessed)	826	792	858	907	929	972	1026	1071	1104	1133		961.8
	Total Reports (raw)	987	936	1001	1061	1103	1152	1212	1259	1312	1314		1133.7
Total Mismatches		184	188	113	149	249	250	268	300	163	153	**2017**	
Total Organisations (preprocessed)		**1013**	**1097**	**1227**	**1297**	**1340**	**1408**	**1480**	**1539**	**1119**	**1141**	12661	1266.1
Total Organisations (raw)		**1228**	**1309**	**1457**	**1532**	**1592**	**1670**	**1744**	**1812**	**1327**	**1323**	14994	1499.4
*Number Mismatch Orgs		151	134	96	109	184	177	193	218	129	127	1518	151.8
*Percentage Mismatch Orgs (preprocessed)		**14.9**	**12.2**	**7.8**	**8.4**	**13.7**	**12.6**	**13.0**	**14.2**	**11.5**	**11.1**		12.0

*Number Mismatch Orgs: organisation appears at LEAST one time in the breakdowns

Preprocessing:

1. Reported periods of previous CDP reports were not considered, e.g., the following ranges were considered for 2010 , 2011, and 2019:
   - 2010: **From** 01 January 2009 **To** 31 December 2010
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2. Only **numeric** values were considered, i.e., values like "Null" or "N/A" were not added to the total sum on each breakdown.

Raw: Original data provided by CDP on each breakdown, i.e., overlapped periods and values such as "Null" and "N/A" were considered as "Total" reports.

Summary

Equation 1 (Reported Global Emissions = Sum of Breakdown)

Scope 1: '*unbalanced internal bookkeeping*' in **29.9%** of the cases, worst in 2010 (36.8%) and with regard to the GHG types breakdown (28.0%), while best in 2013 (21.4%) and with regard to activities (15.0%)

Scope 2: '*unbalanced bookkeeping for purchased energy*' in **23.3%** of the cases, worst in 2015 (28.8%) and with regard to the facilities breakdown (23.3%), while best in 2013 (18%) and with regard to activities (13.6%)

Equation 2 (Reported Global Emissions ≥ Sum of Breakdown)

Scope 1: '*downward biased unbalanced internal bookkeeping*' in **12%** of the cases, worst in 2010 (14.9%), best in 2012 (7.8 %)

Scope 2: '*downward biased unbalanced bookkeeping for purchased energy*' in **9.7%** of the cases, worst in 2015 (13.9%), best in 2012 (5%)

Best Firms – Scope 1 Breakdowns

The following firms **NEVER** made a mistake on any breakdown between 2010 and 2019

	Organization	Country	Activity	Business	Facility	GHG	Region	Total	Max Possible Value
1	Nestle	Switzerland	6	10	9	3	10	**38** (77.6%)	49
2	SK Hynix	South Korea	8	9	9		9	**35** (71.4%)	
3	Tata Steel	India	7	8	8	8	3	**34** (69.4%)	
4	Lundbeck A/S	Denmark	7		9	9	9	**34** (69.4%)	
5	Nobia	Sweden		9	9	4	10	**32** (65.3%)	
6	Ball Corporation	USA	7	10		3	10	**30** (61.2%)	
7	Bayer AG	Germany		10		10	10	**30** (61.2%)	
8	Electrolux	Sweden	7	10	3		10	**30** (61.2%)	
9	Iberdrola SA	Spain		10		10	10	**30** (61.2%)	
10	Marfrig Global Foods S/A	Brazil		10		10	10	**30** (61.2%)	

Conclusions

- Even in a stringent, transparent reporting scheme, a considerable proportion of firms cannot provide accurate carbon emissions breakdowns
- Mistakes are easy to find & do not seem to decrease over time (experience, public pressure) → Companies do not feel pressured to accurately report breakdowns

Take aways

- EU Taxonomy focusses on Business Activities: Quality controls are necessary – especially if companies report only aggregated figures rather the specific breakdowns!
- Suitable software, excel tools, applying the principle of double entry bookkeeping are advised to eliminate discrepancies in breakdowns
- Voluntary disclosure schemes have boundaries in promoting accurate reporting

Thank you!

Your questions and comments are very welcome!