

# Accounting changes in (market-based) Scope 2: an underestimated risk?

11th Annual Risk Governance Conference

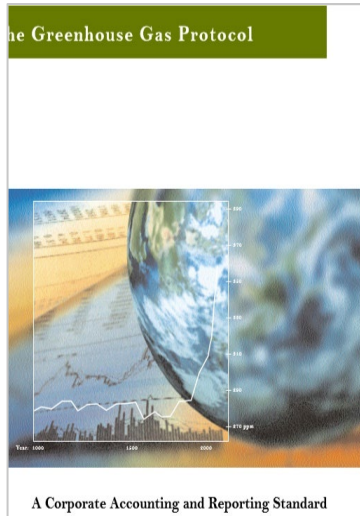
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20. October 2023

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## Background

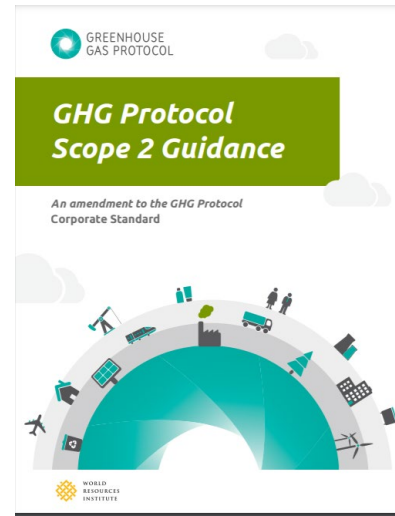
# The GHG Protocol is the most important standard for the accounting of corporate greenhouse gas (GHG) emissions



2004



2011



2015

The standards and guidelines of the Greenhouse Gas (GHG) Protocol enable companies to measure their emitted Greenhouse Gas emissions

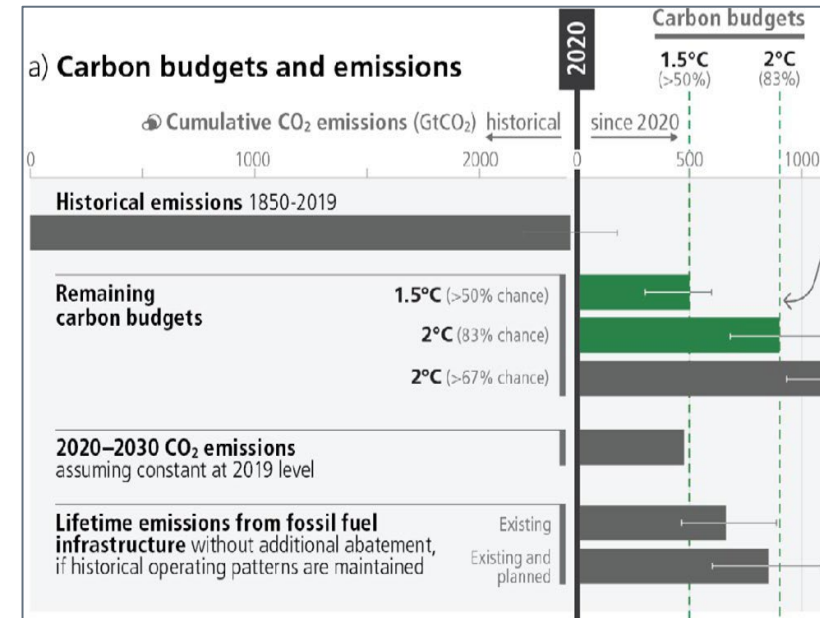
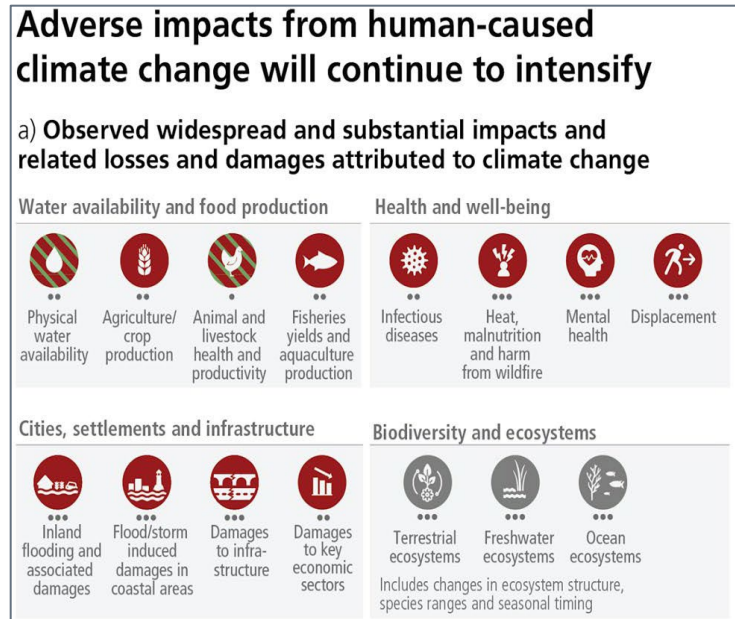
→ **BUT**: only principle-based standard

**9 out of 10** Fortune 500 companies reporting to CDP use the GHG Protocol

→ important: **company-specific** GHG inventory

**All non-financial reporting standards** (including ESRS, ISSB) refer to the accounting standard for calculating GHG emissions

# Remaining GHG budgets to limit warming to 1.5°C could soon be exhausted; deep and rapid decarbonization required



**Impact on global GDP by 2050**

-18% in 3.2°C (without mitigation efforts)

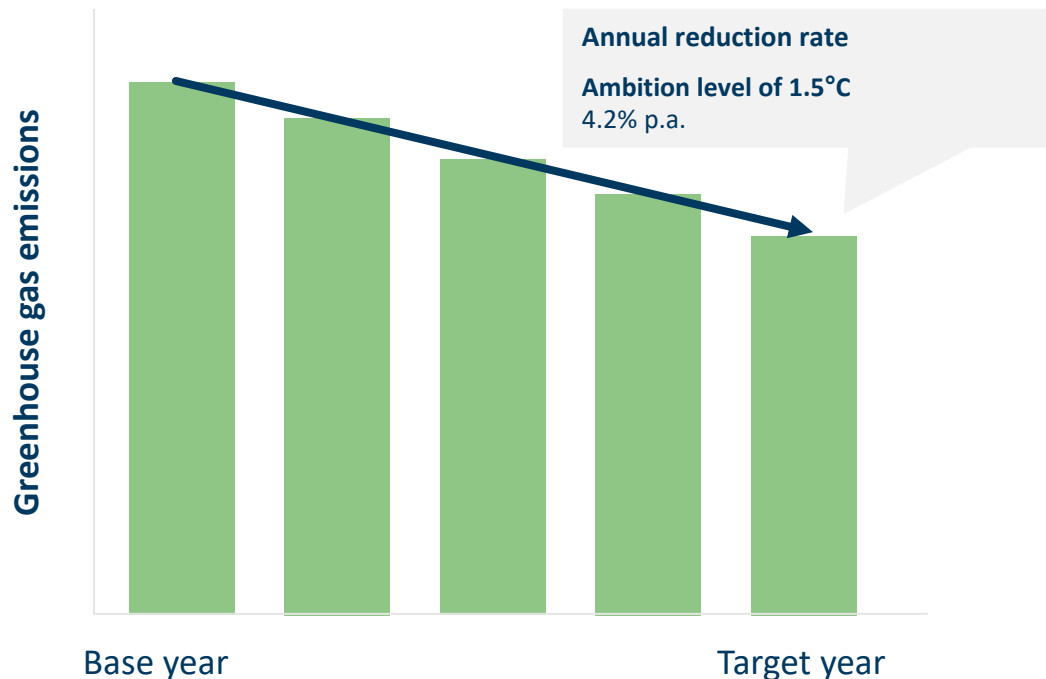
-4% in below 2°C (Paris Agreement targets)

Source: Swiss Re

- To limit warming to 1.5°C or 2°C, **rapid, deep and immediate** reductions in greenhouse gas emissions are needed
- With the Paris Agreement of 2015, **the world's governments have committed to limiting the global** rise in temperature
- The private sector plays** a crucial role in **achieving the target** - every sector in every market must transform and **reduce their emissions in absolute terms**

# Companies increasingly set "science-based" targets and estimate their GHG emissions

Scope 1+2 GHG emissions must decrease in absolute terms to be considered "science-based"\*. >>



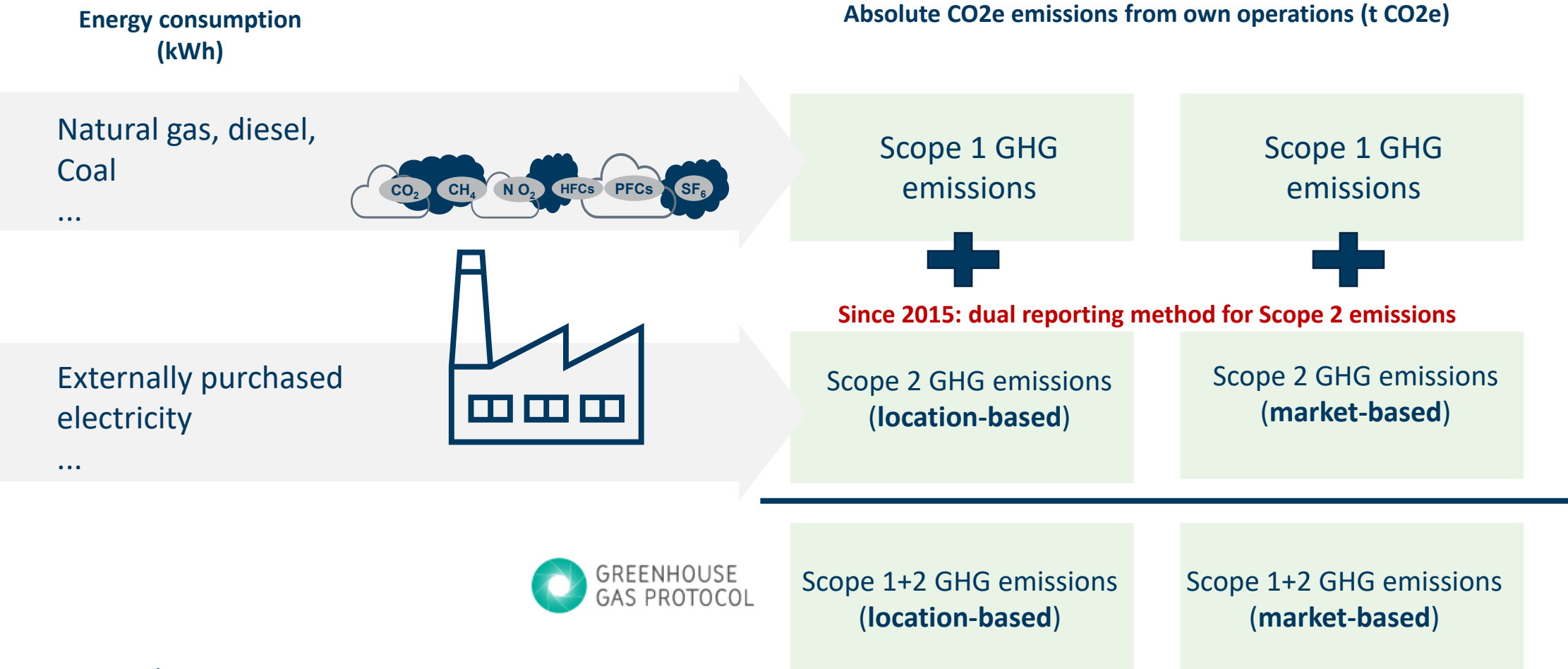
- The total number of companies committed to **science-based targets (SBTs)** has increased 8x in the last five years (SBTi, 2023)
- Companies that commit to SBTi must reduce emissions from their own operations by an **absolute reduction rate** each year
- SBTs are becoming increasingly important: Under the **CSRD**, companies must state whether climate targets are **scientifically sound and 1.5°C compatible**
- Target achievement is tracked through the estimation of an annual **GHG inventory (annual Scope 1+2 GHG emissions)** using the **GHG Protocol**.
- Reporting of GHG balances is increasingly **required** - by regulators (CSRD), but also by customers or banks and investors.



\*SBTi provides an internationally recognised standard methodology for climate targets in line with the Paris Agreement

# Principles of accounting for GHG emissions from own operations

Illustrative



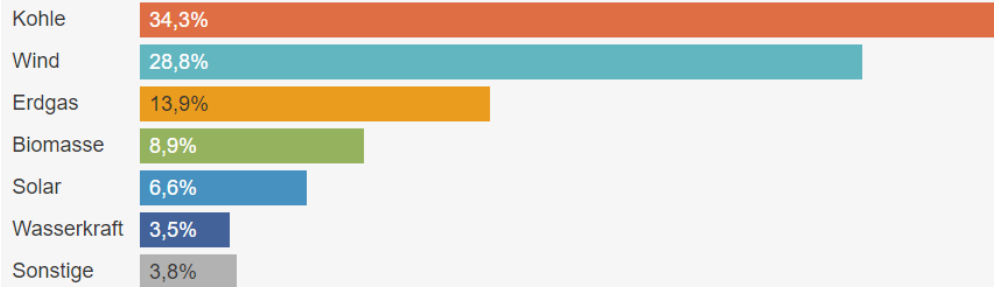
# The location-based method uses the electricity grid mix, the market-based method includes instruments

Purchased electricity  
100 kWh (Germany)



Illustrative

## Strommix am Donnerstag, 12.10.2023



Unter "Sonstige" finden sich weitere erneuerbare und fossile Energieträger. Datenabruf am: 13.10.2023  
Grafik: NDR Data • Quelle: [Fraunhofer ISE](#) • [Daten herunterladen](#)

Scope 2 GHG emissions  
(location-based)

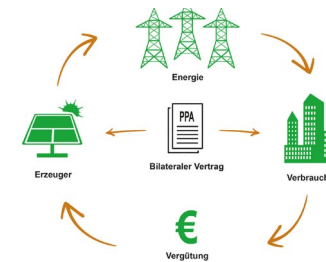
Grid mix

Scope 2 GHG emissions  
(market-based)

Ren. electricity instruments

Green supplier tariffs

Power Purchase  
Agreements (PPAs)



(unbundled) renewable  
electricity certificates

Unsere Empfehlung

12  
grün  
Fair Ökostrom 12  
82,39 €<sup>1</sup>  
pro Monat

- ✓ 100 % Ökostrom
- ✓ Grüner Strom-Label Zertifikat
- ✓ 12 Monate Laufzeit

Norwegian hydropower plant operator can feed in electricity locally and sell GOs\* to an operator of a lignite-fired power plant anywhere in the EU.

This operator, in turn, can then officially sell its electricity as "green electricity". (Unbundled) renewable electricity certificates can be purchased by companies themselves.

# Effects of incorporating market-based instruments into accounting for Scope 2 GHG emissions

Illustrative

Natural gas  
100 kWh

Purchased electricity  
100 kWh (Germany)

location-based

100 kWh x 0.2023 kg  
CO<sub>2</sub>e/kWh = **20.23**

+

100 kWh x 0.3191 kg  
CO<sub>2</sub>e/kWh = **31.91**

**52.14 kg CO<sub>2</sub>e**

location-based

market-based

100 kWh x 0.2023 kg  
CO<sub>2</sub>e/kWh = **20.23**

+

100 kWh x **0 kg**  
CO<sub>2</sub>e/kWh = **0**

**20.23 kg CO<sub>2</sub>e**

market-based

- Accounting includes renewable electricity instruments in the calculation
- Companies can claim a zero emission factor for electricity provided by their individual suppliers (e.g., through 100% green electricity contracts)
- Inclusion of a **zero emission factor** associated with the generation of renewable electricity through the purchase of **renewable electricity certificates** (non-bundled or bundled)

# Problems with current accounting practices have triggered an update of the GHG Protocol until 2025

## Criticism of market-based accounting

- From the perspective of a **representative GHG inventory**, market instruments should be excluded from GHG inventory accounting as it does **not reflect the emissions that are actually emitted** (Brander et al, 2018)
- The effectiveness of **certificates** to promote the **expansion of electricity from renewable energies** is low (Mulder & Zomer, 2016)
- Hydropower plants built between **1950 and 1979** are the **main beneficiaries of the GO\* system** (Galzi, 2023)
- Lack of additionality: Widespread use of **certificates** by companies with science-based targets has **led to an overestimation of the effectiveness of reductions - many certificates do not lead to an absolute reduction of emissions or to the expansion of renewable energies** (Björn et al, 2022)
- **Double counting of electricity from renewables** through SBTi target tracking, which is both site and market-based at international level → Case of Norway

GHG Protocol to revise accounting standard by 2025 and seek significant changes to Scope 2



# Study provides insights into current practice and assesses the impact of potential accounting changes

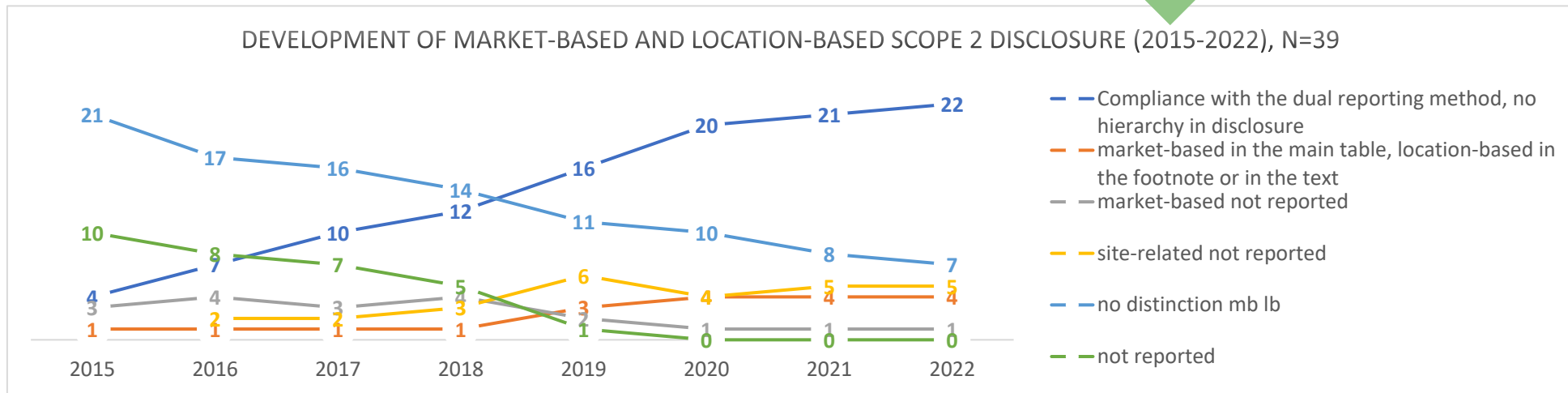
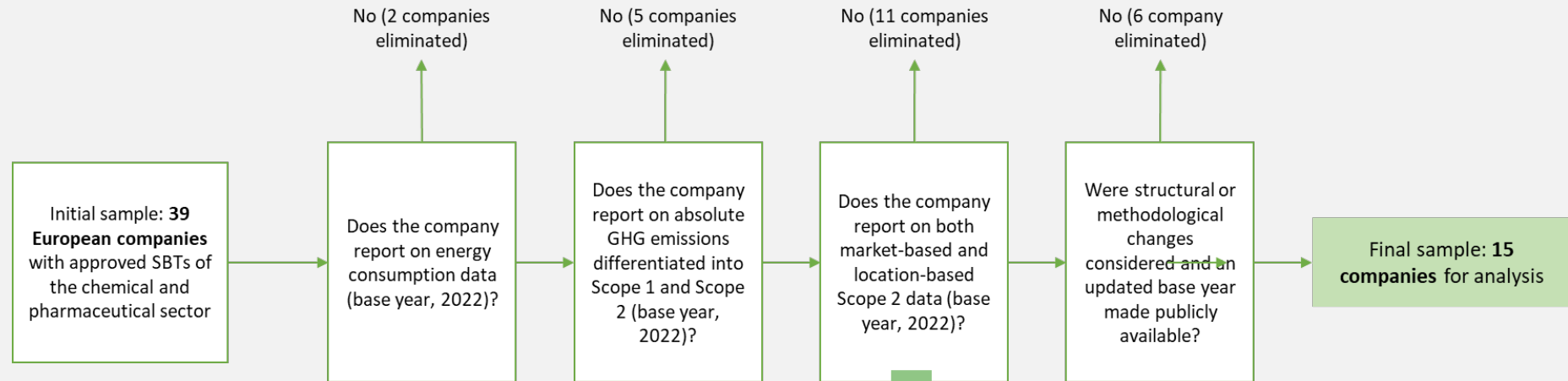
Study examines the **status quo of climate strategies** of European companies in the chemical and pharmaceutical industry by analysing the **development of Scope 1+2 emissions** between their science-based base year and 2022.

**Two scenarios** of possible **accounting changes** of Scope 2 emissions:

- *How important is the reduction of Scope 2 emissions for SBT target achievement?*
- *How are companies affected when the accounting rules for Scope 2 change (GHG inventories and SBT results)?*
- *What conclusions can be drawn from the results? How can risks from accounting changes be mitigated?*
- *What do the results mean for companies, investors and standard setters?*

# Process for determining the final sample

- Sample consists of **39 European companies** in the chemical and pharmaceutical industry with validated **science-based targets** (as of 12 July 2023)
- Data was collected from the companies' corporate reports\*



Results

# The purchase of renewable electricity has gained importance in recent years

Company *	SBT Base year	Change in energy consumption	Base year % Share of electricity	2022 % Share electricity	Base year % Share of renewable electricity of total electricity	2022 % Share of renewable electricity of total electricity
Bayer AG	2019	-17%	56%	48%	2%	48%
Solvay	2018	-12%	24%	n.a.	n.a.	n.a.
AstraZeneca	2015	-11%	41%	n.a.	16%	n.a.
Linde plc	2021	-2%	59%	59%	28%	30%
Chiesi Farmaceutici S.p.A.	2019	0%	35%	37%	21%	99%
Ipsen SA	2019	0%	58%	59%	41%	90%
Novozymes A/S	2018	0%	60%	57%	37%	82%
Hempel A/S	2019	1%	n.a.	n.a.	n.a.	n.a.
Merck KGaA	2020	2%	40%	40%	27%	50%
Wacker Chemie AG	2020	3%	44%	44%	n.a.	n.a.
Topsoe A/S	2020	4%	n.a.	n.a.	n.a.	n.a.
Corbion	2021	4%	23%	24%	79%	93%
Lundbeck A/S	2019	4%	42%	42%	51%	66%
QIAGEN N.V.	2020	11%	46%	38%	0%	71%
LEO Pharma A/S	2019	14%	32%	28%	11%	91%

## Main findings

- **Total energy consumption** remains constant between the base year and 2022, in some cases even increases
- The share of purchased electricity in energy consumption remained constant (between 24-60%) - hardly any electrification of processes?
- **Share of purchased renewable electricity in electricity consumption increased significantly**
- Chiesi Farmaceutici increased its share **21% in 2019 to 99% in 2022**
- Qiagen N.V. increased its share of renewable electricity from **0 to 71%** (2020-2022)

\*All companies using market-based data to track SBT targets; some companies did not provide the required data

Results

# By considering renewable electricity instruments, companies achieve a strong reduction in Scope 1+2 emissions

Company *	SBT Base year	Base year Scope 1+2 (market-based) emissions t CO2e	2022 Scope 1+2 (market-based) emissions t CO2e	Change in energy consumption	Change Scope 1 emissions	Change Scope 2 (market-based)	Change Scope 1 + 2 (market-based)	Required reduction from base year to 2022 (1.5°/wb2°)
Bayer AG	2019	3.760.000	3.030.000	-17%	-8%	-33%	-19%	-12,6%
Solvay	2018	12.300.000	10.300.000	-12%	-12%	-42%	-16%	-10%
AstraZeneca	2015	646.955	263.608	-11%	-20%	-95%	-59%	-29,4%
Linde plc	2021	39.894.000	38.794.000	-2%	3%	-7%	-3%	-2,5%
Chiesi Farmaceutici S.p.A.	2019	64.508	49.120	0%	-1%	-95%	-24%	-12,6%
Ipsen SA	2019	18.659	13.487	0%	-17%	-64%	-28%	-12,6%
Novozymes A/S	2018	437.000	161.000	0%	21%	-71%	-63%	-16,8%
Hempel A/S	2019	43.089	19.090	1%	-7%	-68%	-56%	-12,6%
Merck KGaA	2020	2.028.000	1.667.000	2%	-16%	-25%	-18%	-8,4%
Wacker Chemie AG	2020	3.625.000	3.234.000	3%	1%	-18%	-11%	-8,4%
Topsoe A/S	2020	156.000	115.000	4%	-13%	-71%	-26%	-8,4%
Corbion	2021	155.000	142.000	4%	1%	-29%	-8%	-4,2%
Lundbeck A/S	2019	38.430	27.173	4%	-21%	-55%	-29%	-12,6%
QIAGEN N.V.	2020	20.618	16.252	11%	31%	-72%	-21%	-8,4%
LEO Pharma A/S	2019	38.771	22.523	14%	-10%	-95%	-42%	-12,6%

\*All companies using market-based for SBT target tracking

## Main findings

- Scope 2 emissions (market-based) decrease **by -56% on average**
- Decrease in Scope 2 balances off increases in energy consumption and Scope 1 emissions
- Using the market-based approach, **all companies are on SBT course by 2022** (4.2% p.a. and 2.5% p.a. reduction rate)

## Scenario 1

**What happens if renewable electricity instruments are no longer included in accounting for a GHG inventory?**

Results

# When using grid mix factors, scope 2 emissions increase significantly and achieving SBTs becomes more difficult

Company *	SBT Base year	Base year Scope 1+2 (location-based) emissions t CO2e	2022 Scope 1+2 (location-based) emissions t CO2e	2022 Difference Scope 2 market-based and location-based	Change Scope 1 emissions	Change Scope 2 (location-based)	Change Scope 1 + 2 (location-based)	Required reduction from base year to 2022 (1.5°/wb2°)
Bayer AG	2019	3.850.000	3.470.000	440.000	-8%	-12%	-10%	-12,6%
Solvay	2018	12.400.000	10.700.000	400.000	-12%	-25%	-14%	-10%
AstraZeneca	2015	596.079	440.243	176.635	-20%	-33%	-26%	-29,4%
Linde plc	2021	37.721.000	37.713.000	- 1.081.000	3%	-2%	0%	-2,5%
Chiesi Farmaceutici S.p.A.	2019	61.875	59.587	10.467	-1%	-13%	-4%	-12,6%
Ipsen SA	2019	23.986	18.810	5.323	-17%	-29%	-22%	-12,6%
Novozymes A/S	2018	490.000	378.000	217.000	21%	-27%	-23%	-16,8%
Hempel A/S	2019	38.152	34.480	15.390	-7%	-10%	-10%	-12,6%
Merck KGaA	2020	2.128.000	1.802.000	135.000	-16%	-11%	-15%	-8,4%
Wacker Chemie AG	2020	2.864.000	2.628.000	- 606.000	1%	-16%	-8%	-8,4%
Topsoe A/S	2020	137.000	118.000	3.000	-13%	-19%	-14%	-8,4%
Corbion	2021	197.000	197.000	55.000	1%	-1%	0%	-4,2%
Lundbeck A/S	2019	46.770	38.443	11.270	-21%	-13%	-18%	-12,6%
QIAGEN N.V.	2020	26.056	30.399	14.147	31%	7%	17%	-8,4%
LEO Pharma A/S	2019	34.452	29.692	7.169	-10%	-24%	-14%	-12,6%

## Main findings

- With the exception of two companies\*\*, the **location-based** emissions in 2022 are **significantly higher**
- The reduction of Scope 2 is now only **-15% on average** (previously: **-56%**)
- Significant **impact on total Scope 1+2 reduction** and current target achievement
- Qiagen's emissions increase by **+17%** (previously: **-21%**)

## Scenario 2

**What happens if only renewable electricity instruments with an "additionality" criterion can be included?**

## Analysis of the effects of additionality criteria for market-based instruments only possible qualitatively

- Companies have reported very **differently** on the **nature of their green power instruments**:

*“10 out of 12 Corbion sites are now **100% powered by renewable electricity**, which increases our global coverage to 93%.” (Corbion, 2022)*

*“For the market-based method, a zero emission factor was used for electricity purchased from renewable sources through either **PPAs, green tariff or purchase of Guarantees of Origin**.” (Chiesi Farmaceutici S.p.A., 2022)*

- Companies **did not report on the shares of instrument coverage** or amounts of renewable electricity covered by certain instruments (even though requirement of GHG protocol)
- Diverse types of sourcing methods and tracking instruments **impeded a detailed categorization** of renewable electricity instruments
- **No quantitative analysis** could be conducted



Results

# Differences in renewable purchasing strategies imply varying vulnerability of companies towards Scope 2 accounting changes

Different renewable energy procurement strategies and developments over time have been observed:

- Many companies relied on a **mix of instruments**, including certificates, but also other options
- Some companies have fully focused on **unbundled green power certificates for 100% of their purchased renewable electricity**
  
- Companies can be affected very differently by the risk of future Scope 2 accounting changes, depending on the **quality and type of instruments** they purchase
- SBTi has launched a call for more scientific knowledge on the effectiveness of (unbundled) certificates in September 2023 → High probability that **not all instruments** can be used in the **future for SBT tracking**

## Analysis also shows: companies are increasingly focusing on long-term power purchase agreements and developing green power strategies

Companies in the sample increasingly consider **quality criteria** in their purchasing decisions by focusing on **long-term (virtual) power purchase agreements (PPAs)**, e.g.

*“After signing a **12-year Virtual Power Purchase Agreement (VPPA)** with the Azure Sky Wind and Storage project, the project went into commercial operation in May 2022. Furthermore, in 2022, we expanded our renewable energy commitment through **another VPPA with a 16-year term**. With these two deals, we cover **90%** of the company’s electricity consumption in the United States and 55% globally” (Bayer, 2022)*

In the absence of guidance, few companies have **developed** holistic **purchasing criteria for electricity from renewable energies**, e.g. **Astrazeneca**:

- 1) *Embedding "**additionality**" criteria and the associated target that more than half of the world's renewable energy should come from **new** sources*
- 2) ***Geographical** relevance, i.e. a link between emission reductions and the networks in which Astrazeneca operates; and*
- 3) *Relevance in **time (Cut off)***

## What conclusions can be drawn from the results? What do the results mean for companies, investors and standard setters?

- **Update of the standard** urgently needed: **clearer separation** between the GHG inventory (what was emitted?) and the climate commitment of companies (what was implemented in the area of green electricity)?
- Current reporting shows **various gaps** and problems regarding **comparability** -> few companies fulfil the dual reporting requirement (including positive bias of sample)
- Analysis shows: science-based climate targets are currently being achieved in particular through the **purchase of renewable electricity**
- "Quick and easy" achievement of reductions with the help of **unbundled renewable electricity certificates** could lead to **reputational risks** in the future
- Businesses can reduce risks (including price risks) by
  - A) Develop a **comprehensive renewable purchasing strategy including quality criteria** (integration of purchasing department + energy management) *and*
  - B) Develop **transition plans** that do not focus exclusively on electricity to reduce emissions (Scope 1, energy efficiencies, renewable self-generation, etc).

**Thank you for your attention**