Comparing ambition of EU companies with science-based targets to EU regulation-imposed reductions

Mark Roelfsema (m.r.roelfsema@uu.nl)
Utrecht University https://orcid.org/0000-0003-2316-2101
Takeshi Kuramochi
NewClimate Institute
Michel Den Elzen
PBL https://orcid.org/0000-0002-5128-8150

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Abstract

Companies can support countries in closing the emissions gap between current policies and the Paris goals by implementing pledged voluntary greenhouse gas (GHG) emission reduction targets that are more stringent than the national climate policy regulation requires. For this purpose, we assessed the potential impact of EU companies with 2030 emission reduction targets approved as 2/1.5 °C-consistent by the Science Based Targets initiative (SBTi) in the sectors that are regulated by the Emissions Trading System (ETS) and Effort Sharing Regulation (ESR). To verify potential additionality, company targets were compared to a current policies scenario based on ETS and ESR trends set under the then applicable 40% by 2030 reduction target, and two scenarios that include the voluntary SBTi targets excluding or including flanking measures to materialise additional reductions in ETS. Depending on the assumption of these flanking measures, EU companies with SBTi-approved targets are projected to result in a 4% or 14% reduction by 2030 relative to the EU current policies scenario. Our results illustrate that SBTi-approved companies are not significantly more ambitious than the rest of the emitters in the EU without flanking measures. However, it does show that companies regulated by ETS show higher estimated reductions by 2030 compared to those only regulated by ESR. This analysis shows that more policy detail is important in assessing the additionality of voluntary targets, resulting in zero additional emissions for ETS if a conservative estimate is required.

1 Introduction

Voluntary actions from non-state actors are still high on the United Nations Framework Convention on Climate Change (UNFCCC) agenda. The Glasgow Climate Pact reiterated the important role of Non-Party stakeholders such as business, sub-national actors, and civil society (UNFCCC, 2021). The Pact expressed appreciation for their setting and enhancing climate pledges, while also encouraging them to further strengthen their credible and durable responses. One year later at COP27, the Sharm el Sheikh Implementation Plan promotes greater accountability of voluntary initiatives (UNFCCC, 2022).

The quantification of the impact on greenhouse gas (GHG) emissions from non-state and subnational climate actions, both ex-ante and ex-post, is still at an early stage of development compared to the assessment of policies from national governments at the country level. In addition, it is more complex due to the interaction among these actions and national policies. If non-state and subnational actors have put forward more ambitious (voluntary) targets compared to those implied by national policies, additional reductions relative to a current policy scenario by 2030 might be expected. But how much and under which circumstances? An increasing number of studies on the potential GHG impact of non-state climate action have been published in the last few years (America’s Pledge, 2018; Hsu et al., 2018; Kuramochi et al., 2020; Roelfsema et al., 2018). These publications make general assumptions on the additional impact of non-state actors to national policies on the basis of economy-wide emissions projections. Therefore, one of the main topics on the research agenda is to get more insights in the additionality of non-state and subnational climate actions to national policies or targets.

The additional impact of non-state actors to national policies depends on the overlap and additionality of their emission reduction targets. Overlap occurs if non-state actors target the same emissions and sectors, and additionality occurs if one actor has a more ambitious commitment in case of overlap (Hsu et al., 2019b). The studies by Kuramochi et al. (2020), NewClimate Institute et al. (2019) and Lui et al. (2021) assume additional reductions if non-state or subnational targets are more ambitious than those implied by national current policies. On the national level, the estimated residual (percentage) part on top of national (percentage) reductions are seen as additional, based on the assumption that non-state and subnational climate actions do not replace action elsewhere. This assumption is currently seen as valid, as there is not much coordination between national governments and target setting by companies, cities and regions (Hsu and Rauber, 2021). However, such assumptions could change in the near future, or might not hold in specific circumstances. To what extent these reductions are realised depends on how actors respond to the non-state and subnational actors' climate actions, especially in relation to the domestic policies they face. In addition, these interactions occur at different sectors and between different actors. A first step in dealing with the question about additionality is taking into account more sector detail which can improve assessments of overlap and additionality.

This article investigates the extent to which corporate climate pledges are covered by and additional to implemented public policy instruments. Our geographic focus is the EU27, where energy and industry greenhouse gas (GHG) emissions are regulated by the Emission Trading System (ETS) and Effort Sharing Regulation (ESR). For corporate climate pledges, we considered the companies with GHG emission reduction targets that have been approved by the Science Based Targets initiatives (SBTi) until 2020. Hence we pose the following research question:

What is the potential impact by 2030 of climate actions from EU companies with emission reduction targets approved by the Science Based Targets initiative (hereinafter, 'SBTi companies') on GHG emissions, in terms of additionality to the implementation of the Emission Trading System (EU ETS) and the Effort Sharing Regulation (ESR)?

We have used 1 January 2020 as the cut-off date for our assessment, meaning that the EU ETS and ESR were in line with the EU economy-wide target of a 40% reduction from 1990 levels by 2030. This target was secured in the 2030 climate & energy framework (EC, 2013) articulating to be consistent with keeping global temperature increase below 2 °C. However, according to Du Pont (2017), this does not hold for all equity approaches. The result of our assessment is an estimate of the overlap and additionality of SBTi company reductions that could have been expected, if fully achieved and not displacing action elsewhere, compared to the two policy instruments implemented to achieve the EU's first NDC.

2 Eu Regulations And The Science Based Targets Initiative

2.1 ETS and ESR

The key target in the 2030 climate and energy framework that applied in 2020 aimed to cut GHG emissions by 40% relative to 1990 level addressing the long-term goal to keep temperature increase to below 2°C compared to pre-industrial levels (Commission, 2014; European Commission, 2014). This target was to be implemented by the EU ETS, the Effort Sharing regulation, and regulation for Emissions from Land Use and Land use Change and Forestry LULUCF (European Commission, 2022). The EU ETS sets a sector-wide cap for all power generators and energy-intensive industries located in the 27 EU Member States (EU27), and enables these companies to buy and sell emission allowances, while the ESR sets Member State targets for the other sectors: light-industry, transport, buildings sectors. LULUCF emissions are treated separately (EC, 2018), but fall outside the scope of this analysis.

The EU ETS covers around 40% of total EU GHG emissions excluding LULUCF (EC, 2020a). Norway and Iceland also participated in the ETS. These GHG emissions are emitted by heavy industry, energy supply and aviation companies residing in the EU, Iceland, and Norway. EU ETS is a cap-and-trade system that sets a maximum amount of total annual emissions emitted by all companies participating in the system. The total cap in 2020 is 43% below 2005 level by 2030; between 2021 and 2030 the cap will annually decrease by 2.2%. Companies are called account holders that own one or more installations with a net heat excess of 20 MW fall under ETS. Each installation needs to surrender allowances each year to cover its emissions. By default, the companies owning these installations acquire allowances from a periodical auction, or via trading on the European Energy Exchange or ICE Futures Europe. To improve the resilience of the ETS system, the EU operates a Market Stability Reserve (MSR) that withholds or releases allowances in case of major shocks. ETS emissions allowances, verified emissions and transactions from auctioning and trading are registered in the European Union Transaction Log (EUTL) (EC, n.d.).

The EU Effort Sharing Regulation (ESR) adopted in 2018 covers GHG emissions that are not covered by ETS and LULUCF, and are around 60% of total EU emissions excl. LULUCF. These emissions include those from citizens, national and local government own operations, and companies not covered by ETS. The overall ESR reduction target is 30% by 2030 compared to 2005 levels (EC, 2020b) and is translated into binding emissions targets for Member States based on the principles of fairness, cost-effectiveness and environmental integrity (European Union, 2020a, 2018). Norway and Iceland have similar reduction targets with the same obligations as EU Member States (European Commission, 2019). The ESR reduction targets need to be achieved by implementation of policies by each Member State and overlap with several EU policy instruments such as the CO2 performance standards for cars and trucks and the Building Code Directive.

2.2 Science Based Targets initiative

The Science Based Targets initiative (SBTi) aims to “define and promote best practices in emissions reductions and promote companies to take the lead on climate action” (Science Based Targets initiative, 2021). In general companies put forward emissions reduction targets to demonstrate the ambition of climate action. Companies that sign up to SBTi must fulfil the criteria set by the initiative. In addition to long-term (often 2050) targets, they are also required to set shorter term targets before or at 2030. Only in the course of 2019 companies started to be encouraged to set emissions targets beyond 2 °C in the

‘Business ambition for 1.5 °C’ (CDP, 2020a). Companies that have a SBTi approved target disclose their emissions and reduction targets to CDP via the annual questionnaire (CDP, 2020b), in which they indicated whether they have set science-based targets, or are in the process of doing this. A company always consists of one headquarter, but can have different country branches. A target in most cases covers the complete company, but setting it at other levels such as business division, business activity or one individual country is possible. The target coverage indicates the percentage of total company emissions covered by the target. A target can cover either or both scope 1 emissions (direct GHG emissions) and scope 2 emissions (electricity consumption-related emissions). Additionally, it could include scope 3 emissions occurring in the supply chain, but outside the company, but these are excluded in our assessment.

3 Data And Methodology

3.1 Data

For consistency, datasets released in 2020 were used. Company data on ETS emissions and targets for 2020 is retrieved from (EC, n.d.; EUETS.INFO, n.d.) (See Supplementary Information for details). The European transaction log (EUTL) is the official registry that keeps track of allowances, transfers, and verified emissions for EU installations and account holders. In 2020, this sums up to more than 5,861 account holders and 12,646 installations (see Table 1). Total GHG emissions covered by ETS for the EU, Norway and Iceland were 1,555 MtCO2eq by 2019 (EEA, 2020), and total ESR emissions were 2,231 MtCO2eq by 2019 (EEA, 2020).

Table 1
2020 GHG emissions ($MtCO_2eq$) and number of companies and installations in the Emission Trading System (ETS) registry and for Effort Sharing Regulation (ESR)

Source	Total emissions ($MtCO_2eq$)	Nr. of account holders	Nr. of installations
ETS	1,555	5,861	12,646
ESR	2,231		

The CDP dataset is assembled from the response to the 2020 questionnaire (CDP, 2021, 2020c). As companies only started to set 1.5 °C targets in the second half of 2019, almost all SBTi targets in the dataset are aligned with the 2 °C limit. CDP requests companies to report emission reduction targets excluding the portion achieved with offset purchases (CDP, 2020c), even though it is not clear to what extent this request has been always followed. We only included companies for which emissions reduction could be quantified, which means the base year, most recent reporting year and target are available. In the dataset, we found 335 companies with SBTi-approved targets that represent 670 $MtCO_2eq$ emissions in 2019, of which 243 $MtCO_2eq$ were emitted by 200 companies across 1,067 branches located in the EU (see Table 2). Table 2 divides total emissions covered by the targets into scope 1 and 2. All scope 2 emissions that occur within the EU boundaries by definition fall under ETS as almost all electricity

companies (except small installations) are regulated under ETS. The CDP database used does not make a distinction between 2°C- and 1.5°C-aligned SBTi targets.

Table 2
2019 GHG emissions from companies operating in the EU27 that have emission reduction targets approved by SBTi ('SBTi companies').

Source:(CDP, 2020b)

Scope 1 emissions ($MtCO_2eq$)	Scope 2 emissions ($MtCO_2eq$)	Total emissions ($MtCO_2eq$)	Nr. Of companies	Nr. Of branches
217	25	243	200	1,067

3.2 Methodology

3.2.1 Emission boundary of the analysis and emission scenarios assessed

The aim of our assessment is to quantify the potential impact of SBTi companies on EU GHG emissions assuming they fully implement their pledged emission reduction targets. For this purpose, we focus on the possible additional reductions to the current implemented policies EU ETS and ESR that together cover all EU sectors except LULUCF (see Fig. 1). Because of the ETS policy design, SBTi companies would not deliver any additional GHG impact in the ETS sector in response to company climate actions, which is called the waterbed effect (Verde et al., 2021), unless the ETS cap is lowered by explicit measures to decrease the number of allowances resulting from lower-than-anticipated emission levels by ETS installations. On the other hand, in the ESR sectors, SBTi companies may deliver additional GHG impact if they do not replace emission reduction efforts elsewhere.

In order to calculate potential additional reductions from SBTi targets that apply in the year 2020 to those that would be achieved under current implemented policies, we construct three scenarios:

1. The EU Current policies scenario (CPS)
2. The EU Current policies + SBTi scenario (CPS + SBTi)
3. The EU Current policies + SBTi scenario + flanking measures (CPS + SBTi+)

The starting point for all scenarios are the GHG emissions for SBTi companies in 2019 from Table 2, and the time horizon of the analysis is between end of year 2019 to 2030. The current policies scenario (CPS) is a reference scenario for the year 2020, and emissions follow ETS and ESR emissions trends between 2019 and 2030 in line with official EU ETS and ESR 'With existing measures' projections (EEA, 2020). The EEA projected trends for EU-wide emissions covered by ETS and ESR. These trends were assumed to apply to each individual company. The ESR projections differ for each Member State according to the established effort sharing rule. We assume that the estimated ESR projections are satisfied through

Member State policy implementation and overlapping EU policy instruments such as CO_2 performance standards for cars. The EU GHG emissions from the EEA scenario 'With existing measures' in this period under ETS on average decline annually by 0.9%, while this is 0.8% for ESR (EEA, 2020). Total EU reductions (excl. LULUCF) in these projections are 39.4% relative to 1990. More details on implementation can be found in the Supplementary Information.

Including individual policy instruments such as ETS and ESR in the assessment gives the opportunity to look in more detail to additionality. This was not possible in Lui et al. (2021) and Kuramochi and Roelfsema et al. (2020) as they assessed additionality at the economy-wide level and assumed that "the pace of action elsewhere is not impacted". However, the ETS instrument acts as a waterbed due to the shared cap of market participants. The ESR instrument sets binding targets for Member States' greenhouse gas emissions and flexibility is only possible within the EU countries. Coordination on greenhouse gas emissions is still low between companies and national governments, and therefore additional reductions could materialise if they are covered by ESR. For this reason, we defined two scenarios that include both EU regulation and SBTi targets.

The *EU Current policies + SBTi scenario (CPS + SBTi)* assumes in addition to the CPS scenario that all company SBTi targets will be achieved, not differentiating between country branches. This scenario displays possible additional reductions from SBTi approved targets compared to current implemented policies. Due to the waterbed effect in the ETS that causes reductions of one company to be sold as allowances to another company, additional reductions from SBTi targets are set to zero. Note this would violate the possible assumption that emission reductions do not replace reductions elsewhere. Additional reductions of emissions covered by ESR are expected to lead to additional reduction in this scenario as are assumed not to replace emissions reductions elsewhere. This assumption is based on the observation that there is not much coordination between actors thus far (Hsu et al., 2019a). Note that the additional reductions can also be negative. To avoid emissions estimates between target year and 2030 to lead to additional reductions relative to the ETS or ESR targets, SBTi targets with a target year before 2030 are extrapolated to 2030 using the ETS or ESR annual reduction rates. SBTi targets with target year beyond 2030 are linearly interpolated between 2019 and target year.

In the *EU Current policies + SBTi + flanking measures scenario (CPS + SBTi+)* it is assumed that supplementary measures are taken to ensure locking in the additional SBTi emission reductions from companies with targets more ambitious than ETS. This would need to be accomplished through the Market Stability Reserve (MSR) that can withhold emission allowances in case of excess supply. In order to materialise the estimated additional reductions, ambitious company targets would need to be reflected in a reduction of the number of allowances. We picture two ways how this could be operated. First, the EU could offer companies the opportunity to cancel additional targeted reductions, preferable based on the EU Reporting Sustainability Standards (European Commission, 2021a) which is in force since 2023. This would require changing the rules of the MSR to anticipate future changes in demand is needed as the current design only responds to current or historical changes in demand (Willner and Perino, 2022). Second, the Science Based Target initiative, or other initiatives, could incorporate the criterium of

cancelation of excess allowances in their target setting process as is done in voluntary schemes. To this end, it is crucial that the allowances are not made available for compliance, but are held in a separate fund, as otherwise the reductions achieved might be smaller (Doda et al., 2021).

3.2.2 Quantification of SBTi companies' emissions under the three policy scenarios

Overlap between SBTi companies and total GHG emissions excluding LULUCF shows the magnitude of EU emissions that is covered by the companies assessed. This is calculated by dividing total GHG emissions from companies with SBTi approved targets by the total EU, Norway and Iceland GHG emissions excluding LULUCF.

Our main objective is to determine the additional reductions of SBTi EU company targets to current EU policies. SBTi companies operating in the EU can have several branches located in different EU Member States (see Fig. 2). To determine additional reductions, GHG emissions covered by the targets need to be divided into those covered by ETS and ESR activities.

Scope 1 emissions are direct emissions resulting from company operations, and are regulated for EU companies by either ETS or ESR depending on whether they satisfy the ETS condition of large installations, while indirect scope 2 emissions from purchasing electricity and heat are always covered by ETS as these are emitted by electricity companies with large installations (see dashed lines in Fig. 2). The ESR emissions can come from companies with ETS installations (heavy industry) that in general also emit GHG emissions because of other activities not covered by ETS (such as heating of buildings or delivery transport), or from light-industry for which emissions are fully covered by ESR.

The allocation of SBTi company emissions into ETS or ESR coverage is established by comparing the scope 1 and 2 emissions from the SBTi companies in the CDP/SBTi dataset with emissions from ETS companies in the EUTL dataset:

1. SBTi companies without ETS installations (mainly acting in light industry sector)
    1. SBTi companies in the CDP dataset, but not in the EUTL dataset do not have ETS installations, and therefore their scope 1 emissions are covered under ESR.
    2. All scope 2 emissions from SBTi companies are covered by ETS as they are generated by large installations from electricity companies.
2. SBTi companies with ETS installations (mainly from heavy industry and electricity sectors)
    1. Current scope 1 emissions from companies that occur in both datasets are assumed to be covered by ETS. If the scope 1 SBTi emissions are higher than the EUTL verified ETS emissions, the remaining emissions are assumed to fall under ESR.
    2. All scope 2 emissions from SBTi companies are covered by ETS as they are generated by large installations from electricity companies.

To determine which companies occur in both the CDP/SBTi and EUTL datasets and therefore have pledged SBTi targets and are regulated by ETS, we needed to match company names. This was done using the fuzzy logic name matching algorithm from Nijhuis (2022) on company names, as these names are often not identical between the two datasets (see Methodology in Supplementary Information). However, especially ETS account holders with divergent names from those in the CDP dataset are difficult to identify and match.

The percentage of EU SBTi emissions covered by ETS is calculated from the GHG emissions in the CDP/SBTi and EUTL datasets for the year 2019. This coverage is defined as the total emissions that are covered by both SBTi EU companies and ETS (1b, 2a, 2b in allocation) divided by total SBTi EU emissions. The percentage of EU SBTi emissions covered by ESR emissions is calculated from the SBTi emissions that are higher than the ETS emissions in the EUTL dataset and SBTi emissions from companies not found in the EUTL dataset (2a and 1a in allocation). This coverage is defined as the total emissions that are covered by the sum of these emissions divided by the total SBTi EU emissions

In addition to the ETS and ESR coverage, it is interesting to calculate the coverage of two different company types with and without ETS installations. This categorisation divides companies into large emitters (heavy industry) that own ETS installations, but also have activities that fall under ESR, and small emitters (light industry) without ETS installations and therefore only ESR activities. The coverage is calculated by dividing the sum of GHG emissions of companies that have both SBTi approved targets and ETS installations by the sum of GHG emissions of all companies with SBTi approved targets.

4 Results

There are 200 companies with 1,067 branches that have pledged SBTi approved targets in the EU, for which the overlap with total EU emissions excluding LULUCF is 6.4%. From this total, 58 companies with SBTi approved targets and consisting of 354 EU branches have own installations covered by ETS. These companies in total cover 210 ETS account holders and 443 installations (see Supplementary Information for details).

Total SBTi emissions for EU branches in 2019 are 243 $MtCO_2eq$ (see Table 2), of which 64 $MtCO_2eq$ from companies without ETS installations, and 179 $MtCO_2eq$ from companies with own installations under EU ETS (see Table 3). From the latter group, 85 MtCO2eq of the emissions were emitted by ETS installations, and the remaining 94 $MtCO_2eq$ are other operations that fall under ESR. In total, the coverage of ETS emissions is forty percent of total emissions from SBTi EU companies, and a remaining 60% for ESR. The SBTi companies with ETS installations (but also emissions covered by ESR) cover 74% of total SBTi EU company emissions.

Table 3
Total GHG emissions for companies in this assessment, categorised into SBTi companies with/without ETS installations, and including ETS/ESR coverage in 2019 ($MtCO_2eq$)

Source	Policy instrument coverage	($MtCO_2eq$) Scope 1 emissions	Scope 2 emissions	Total emissions
SBTi companies without ETS installations	EU ESR	52	*NA*	52
	EU ETS (electricity consumption)	*NA*	12	12
	SUB-TOTAL	52	12	64
	(%-of TOTAL)			(26%)
SBTi companies with ETS installations	EU ESR	94		94
	EU ETS	72	14	85
	SUB-TOTAL	165	4	179
	(%-of TOTAL)			(74%)
SBTi EU branches	**TOTAL**	217	25	243
Coverage	SBTi with ESR	146	*NA*	146
		(67%)	*(NA)*	(60%)
	SBTi with ETS	72	25	97
		(33%)	(100%)	(40%)

Additional reductions indicate the amount by which voluntary SBTi targets are estimated to reduce in beyond enforced by EU regulation. These reductions can be calculated by comparing emissions from the CPS scenario with those from CPS + SBTi and CPS + SBTi + scenarios. Our analysis indicates that the EU SBTi companies are projected to small deliver emissions reductions of 8 $MtCO_2eq$ additional to ETS/ESR (CPS) by 2030 if it is assumed that ETS emissions are not materialised due to the waterbed characteristics of ETS (see Table 4 and Fig. 3). However, supplementary actions to compensate for the waterbed effect could increase this reduction to 25 $MtCO_2eq$. As a results, the voluntary SBTi targets could result in 3.8% decrease of emissions relative to CPS, which is a reduction of 12.6% relative to 2019 in the first SBTi scenario, while this is a 14.3% reduction compared to the CPS scenario and a 22.1% decrease relative to 2019 emissions in the second SBTi scenario.

Table 4
Additionality by 2030 (in $MtCO_2eq$) of SBTi targets to ETS and ESR reductions by 2030 divided into those that overlap with ETS and ESR. Additionality is calculated by comparing emissions in the current policies scenario (CPS) consisting of ETS and ESR and the current policies + SBTi approved targets scenario (CPS + SBTi) that also includes SBTi targets until 2030. The CPS + SBTi + scenarios includes flanking measures to ensure realisation of additional ETS reductions. Due to rounding errors, TOTAL could not exactly add up to the parts.

($MtCO_2eq$)		2019	2030 CPS Total emissions (scope 1 + 2)	2030 CPS + SBTi Total emissions (scope 1 + 2)	2030 CPS + SBTi+ Total emissions (scope 1 + 2)	Additional reduction to CPS	Additional+ reductions to CPS
SBTi companies without ETS installations	ESR	52	47 (47 + 0)	59 (59 + 0)	59 (59 + 0)	-12	-12
(electricity)	ETS	12	11 (0 + 11)	11 (0 + 10)	9 (0 + 9)	0	+ 1
SBTi companies with ETS installations	ESR	94	86 (86 + 0)	65 (65 + 0)	65 (65 + 0)	+ 21	+ 21
	ETS	85	77 (65 + 12)	77 (65 + 12)	55 (48 + 7)	0	+ 22
TOTAL		243	221 (198 + 23)	212 (189 + 23)	189 (172 + 17)	+ 8	+ 32

The total additional reductions can be allocated to the two SBTi company types, 1) those without ETS installations (fully covered by ESR) that are projected to increase emissions by 11 $MtCO_2eq$ additional to the CPS scenario by 2030, and 2) companies that own ETS installations that are estimated to reduce 21 to 43 $MtCO_2eq$ additional to the CPS scenario. The results clearly show that companies with ETS installations that have approved targets, are more ambitious than those that do not own ETS installations (see Fig. 3).

5 Discussion And Conclusions

This study has added new insights to the existing literature on the additionality of non-state actions by assessing company GHG emission levels that can be expected from voluntary targets including more country- and policy/sector-specific context. The assessment was done for the year 2020 when the EU reduction targets was 40% reduction relative to 1990. We compared the targeted reductions for 2030 put forward in the SBTi with those that can be expected from the EU ETS and the ESR. Depending on the

implementation of flanking measures to materialise ETS reduction, EU companies with SBTi approved targets, which jointly emitted 243 $MtCO_2e$ in 2019, are projected to result in either an 8 $MtCO_2eq$ or 32 $MtCO_2eq$ reduction by 2030 compared to the EU current polices scenario representing ETS/ESR emissions trends. This is equal to a 3.8% or 14.3% reduction relative to the current policies scenario projections. Our results suggest that the SBTi companies with their approved targets would only deliver minor GHG emission reductions in addition to national policies in the EU to meet its former 40% target. Only if ETS reductions would be secured through flanking measures, we estimate a 14.3% additional reduction.

It is important to realise that although we compare emission reduction targets as a result of government policies with those expected from voluntary company targets, the governance of these measures differ substantially. The EU reductions are secured in law, and compliance is monitored and verified by appointed EU institutions. This does not hold that strictly for voluntary actions, compliance is monitored and verified by non-party stakeholders such as academia or NGOs, but reductions cannot be enforced. In this article we have proposed two approaches that could secure additional voluntary ambition of companies.

We see three main topics for improvement, which cannot be implemented at this moment due to lack of data. First, SBTi companies' emissions are also addressed by other EU policies besides ETS and ESR, such as building codes or CO_2 performance standards for cars and trucks. However, the breakdown of emissions and targets to this level are not available in the CDP dataset at this moment. This breakdown could also help in dividing the reduction estimates from the ESR regulation that covers other actors besides companies such as citizens and own government emissions. The transport and buildings sector are the two largest sectors in ESR, representing 54% and 34% by 2030 of emissions (EEA, 2021) which also cover these other actor emissions. ESR emissions projections for the residential buildings sector are not available, but if we would exclude road transport from ESR projections, the annual change between 2019 and 2030 for ESR would change from 1.07–1.12%, which would not affect the final results substantially. For the ETS projections, it might be helpful to split the projected emissions into those from electricity companies and industry, since the industry receives free allocations.

Second, no insights are available on how SBTi companies implement their company targets, and we assumed they apply the same reductions to scope 1 and 2 and across countries.

Third, as clarified in Section 3.1 there is uncertainty whether the companies strictly follow the CDP guidance of reporting emission reduction targets excluding the portion to be achieved through offsets; including the use of offsets could lower the estimated additional emission reductions by the companies (Haya et al., 2020). Offsets can be used both for scope 1 and scope 2 (renewable certificates) emissions.

We conclude that as companies did not diversify their climate strategies across countries and scopes (yet), which is clearly visible from the lack of detailed data on country, the SBTi targets (from the CDP database) are applicable to the EU branches from our assessment.

Climate policies and legislation are constantly being updated. The current ETS cap to ensure 43% reduction relative to 2005 was established in 2018, is currently being adjusted to align it with the Fit-for-55 package (European Commission, 2021b) and the updated EU NDC target of 55% reduction relative to 1990 by 2030 (European Union, 2020b). In addition, the transport and buildings sector are expected to be included in ETS. These trends show the existence of an ambition loop, where governments and companies encourage each other to accelerate climate actions (United Nations Global Compact et al., 2018). After the EU legislation is secured and companies have responded, a new analysis would be able to give insights if the current finding of companies that fall under ETS are still more ambitious than national regulation still holds. Therefore, it is equally important to assess the progress companies make towards achieving their goals, which varies significantly among companies (Giesekam et al., 2021).

We conclude that the more detailed policy and sector analysis applied in this article provided two main insights. First, it highlighted the importance of including the interaction of voluntary company targets with different policy instruments as it could lead to different outcomes. Therefore, future assessments should particularly consider the characteristics of emissions trading systems when compared to company targets. Particularly, it is important to account for the rules of the trading system. If a conservate estimate is required, no additional reductions should be assumed. Second, we conclude that companies in our assessment regulated by ETS are more ambitious that those only regulated by ESR which have no company-specific policies. This finding is complementary to earlier research by Baie et al (2022) and SBTi (2021), that more generally showed that SBTi companies tend to set more ambitious targets than other companies. However, further research is needed to identify the reasons for this higher ambition among SBTi companies under ETS regulation.

Declarations

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Competing interests

The authors declare that there are no competing interests.

Author Contribution

Mark Roelfsema executed the data collection and analysis. Both Mark Roelfsema and Takeshi Kuramochi have written the main text of the article. Michel den Elzen is project leader of the project for which the internal draft (report) version was written, and supported with ideas and helped in all reviews from report draft to final version of the article.

Data Availability

The data that support the findings of this study are available from the corresponding author, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of CDP.

The results of the name matching of SBTi and EU ETS company names and data for Figure 3 are available in the Supplementary Information.

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Figures

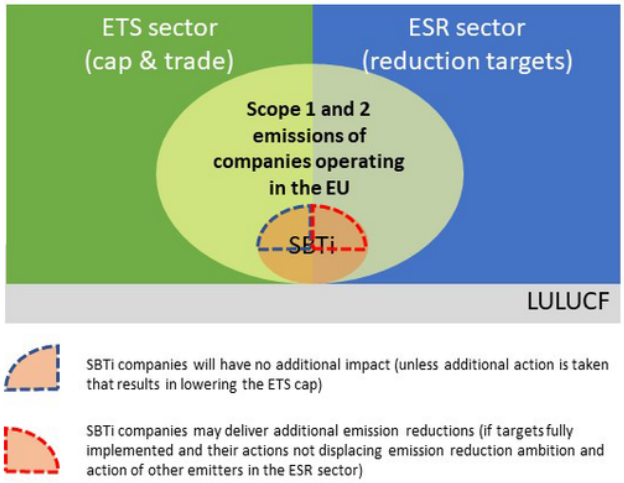

Figure 1

EU companies' scope 1 and 2 emissions in the context of total EU emissions and coverage of these emissions by the Emissions Trading System (ETS), Effort Sharing Regulation (ESR) or Land-Use, Land-Use Change and Forestry (LULUCF)

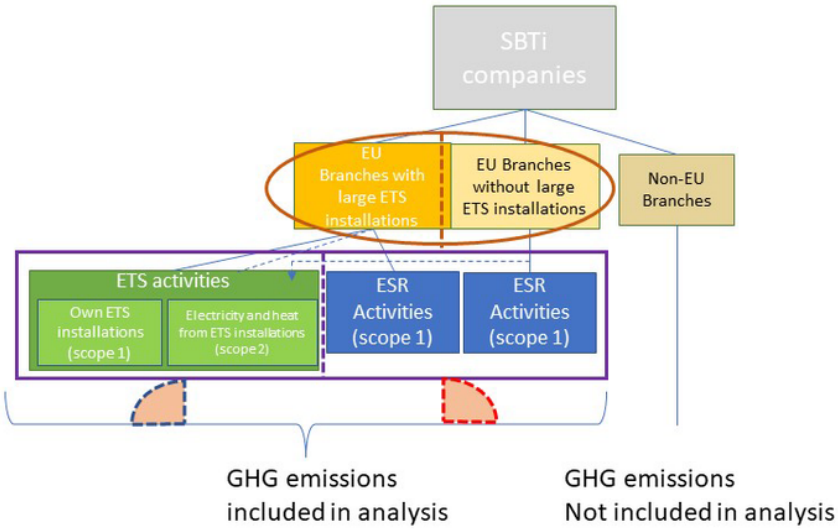

Figure 2

Categorisation of emissions from companies with SBTi approved targets from EU branches indicating emissions coverage of company type (with/without ETS installations) and overlap of GHG emissions per company with policy instrument coverage. The dashed lines indicates the scope 2 (purchased) electricity emissions from companies with/without ETS installations, but emitted by companies that fall under ETS.

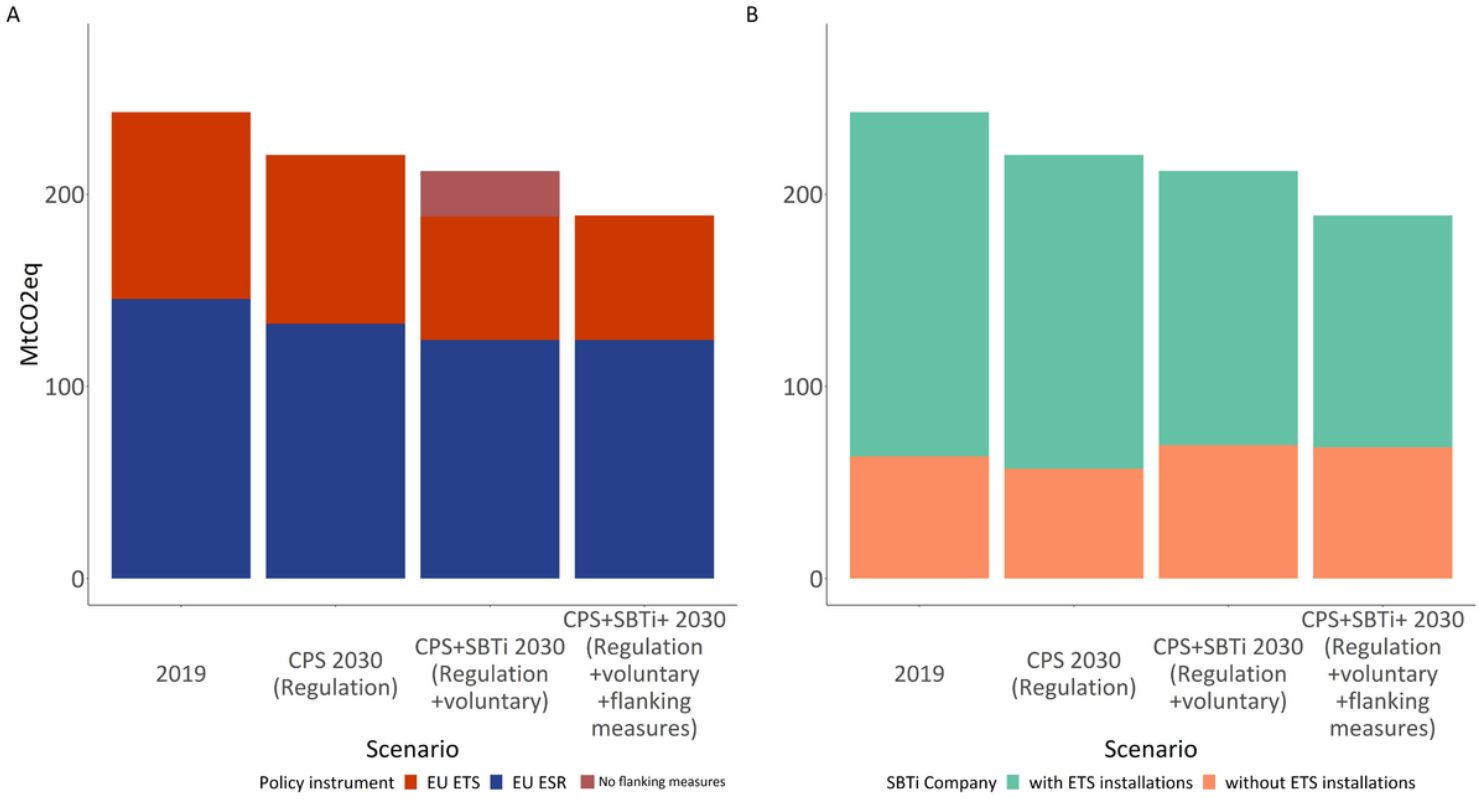

Figure 3

Total GHG emissions in 2019 and 2030 representing historical emissions, emissions in the EU current policies scenario, and the EU current policies and SBTi scenario. A) categorised per policy instrument, B) per type of company

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- DataFigure3.xlsx
- EUSBTiETSandESR.xlsx
- SupplementaryInformation.docx