SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

SETTING 1.5˚C-ALIGNED SCIENCE-BASED TARGETS:

QUICK START GUIDE FOR ELECTRIC UTILITIES

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DEVELOPED BY

CDP
DISCLOSURE INSIGHT ACTION

WITH SUPPORT FROM

Guidehouse

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During the development of this work, we also had the advice of the SBTi Scientific Advisory Group and stakeholders participating in a public consultation webinar in March 2020.

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INTRODUCTION

The Intergovernmental Panel on Climate Change's (IPCC's) *Special Report on Global Warming of 1.5°C* has laid out a stark obligation: we must pursue "rapid, far-reaching, and unprecedented changes in all aspects of society" to hold temperature rise to 1.5°C above preindustrial levels or face irreversible damage to our societies, economies, and the natural world (IPCC, 2018). In response to this urgency, the Science Based Targets initiative (SBTi) has introduced technical resources that enable companies to set greenhouse gas (GHG) emissions reduction targets in line with the flagship goal of the Paris Agreement, limiting warming to 1.5°C. This guidance accompanies the SBTi's selection of a set of 1.5°C pathways for the power sector and specifies how these pathways may be used to establish emissions reduction targets that demonstrate the highest level of climate leadership.

Electric utilities play a crucial role in a decarbonized society

In all climate scenarios that limit warming to 1.5°C, the share of electricity in final energy consumption grows steadily between 2020 and 2050 (Rogelj, et al., 2018). Reasons for this trend are multifaceted but primarily reflect the potential for electricity to decarbonize at a much faster rate than alternative energy carriers. Trends in projected electricity growth are shown in Figure 1.

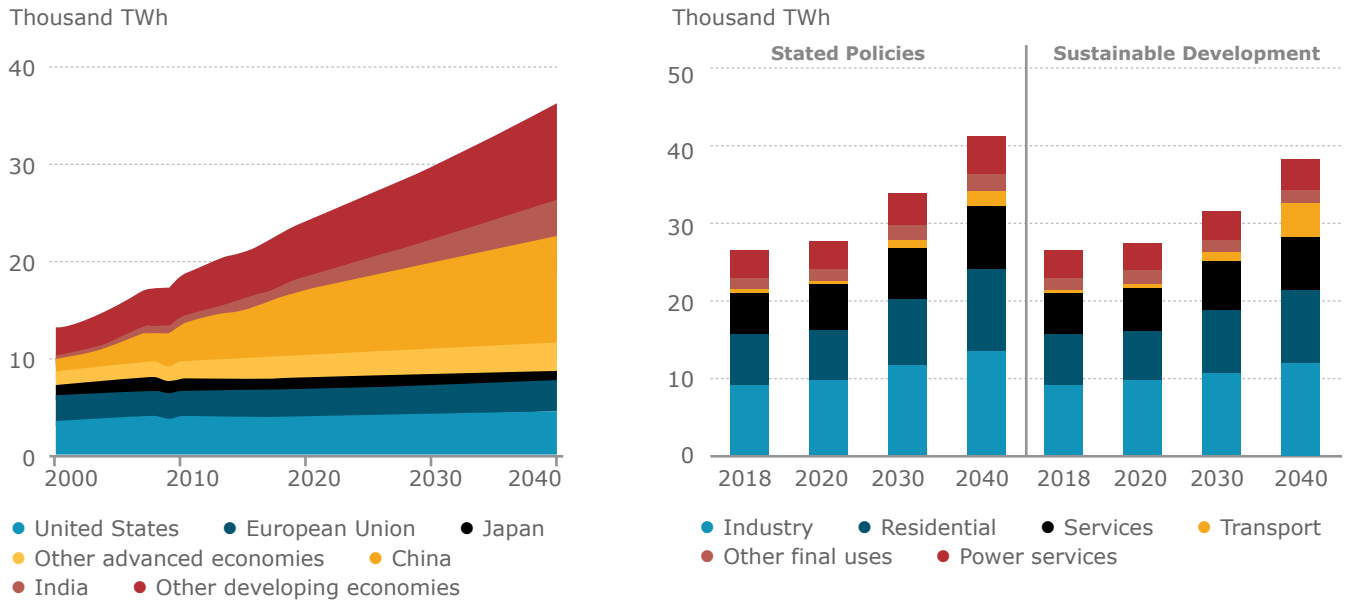


Figure 1: Projected increase of global electricity use in the IEA's Stated Policies Scenario (left) and the increase of electricity use in several economic sectors in the IEA's Stated Policies Scenario and Sustainable Development Scenario (right) (International Energy Agency, 2019a).

Companies and utilities are recognizing the business benefits of taking climate action, finding that it helps to improve brand reputation, increases investor confidence, boosts resilience against regulations, and achieves cost reductions. Corporate leadership can also advocate for strong climate policy, as current policies are insufficient for meeting the global goal of limiting warming to 1.5°C. The debate has quickly shifted from what is practical or easy – the incremental changes and quick wins – to action that is grounded in the latest science.

Decarbonization options for electric utilities

The power sector can establish steep emissions reductions due to rapid technology cost reductions for solar, wind, and storage; expansion of enabling conditions that arise from national and subnational goals; and growing demand for renewable electricity. Figure 2 shows the increase in volume of power purchase agreements (PPAs), a trend that is likely to continue in coming years as many companies outside the power sector incorporate purchased renewable energy through bundled PPAs into their climate action strategies. Nonetheless, electric utilities also need to establish innovative business models around smart grids, demand management, and energy storage to be consistent with a net-zero economy. The next section examines scenarios for the power sector and the following section reviews science-based target-setting methods and provides practical guidance.

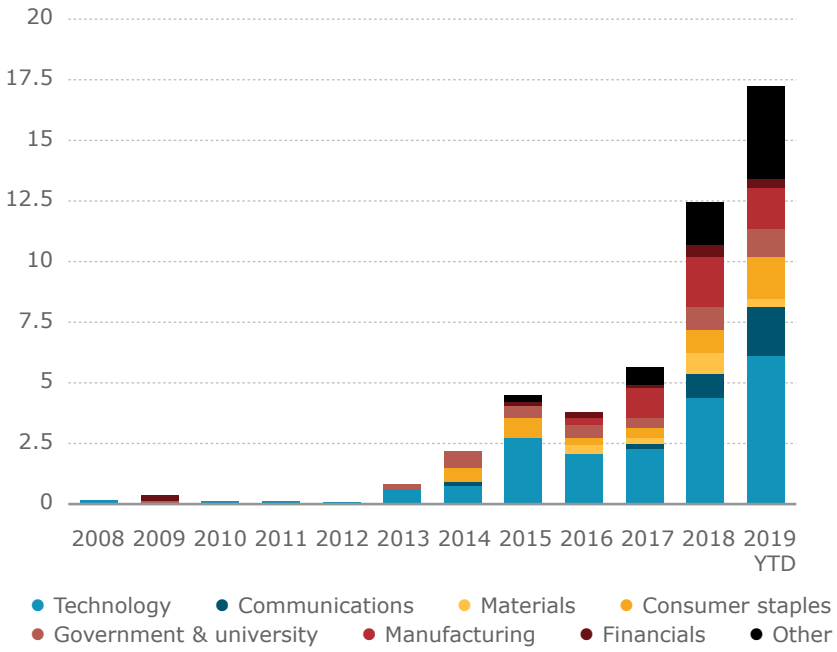
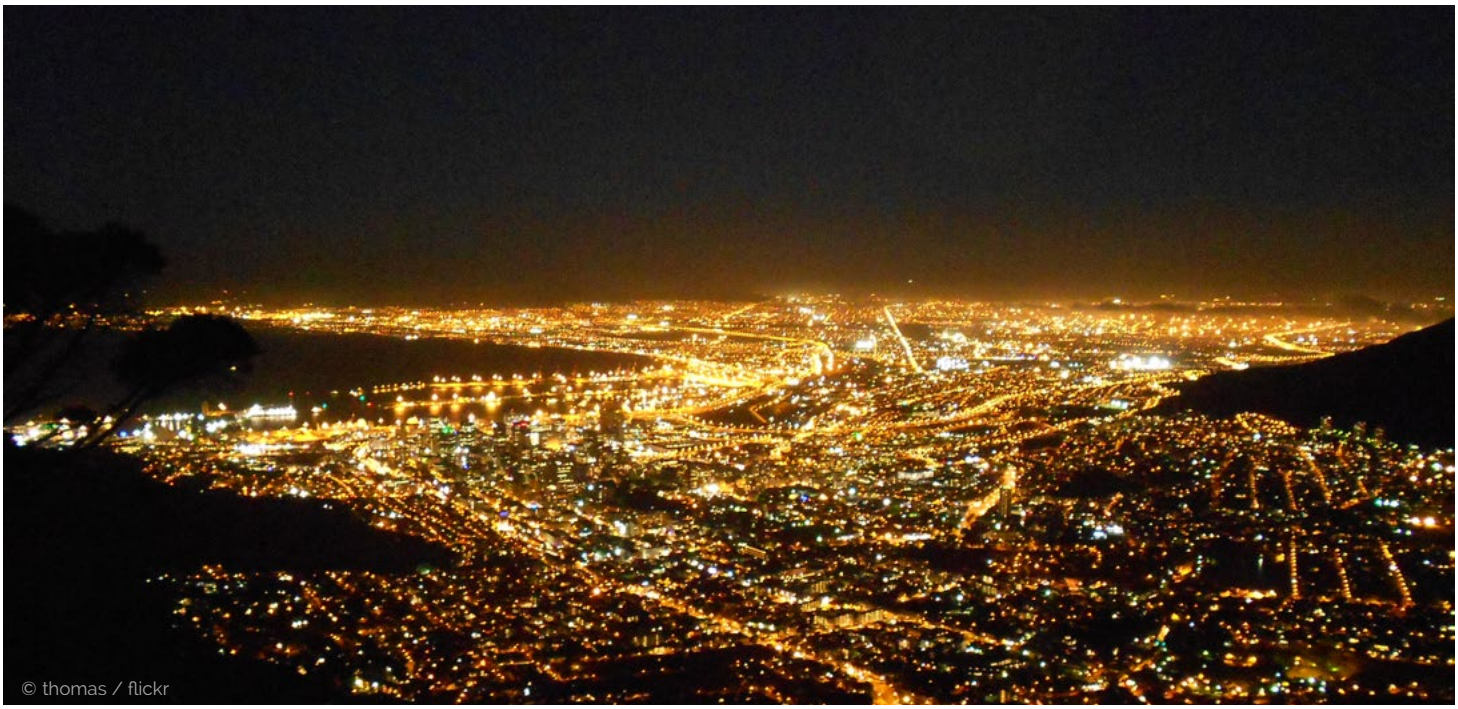


Figure 2: Global PPA volumes by sector, 2009-2019 (International Energy Agency, 2019b).



WHAT THE SCIENCE TELLS US IS NECESSARY

Limiting warming to 1.5˚C means that global GHG emissions need to be reduced by half by 2030 and to approach net-zero by 2050 (Johan Rockstrom, 2017; UNEP, 2019). This requires a comprehensive transformation across virtually all economic sectors. The energy system will play a central role in this transformation, as nearly three-quarters of today's emissions are energy-related – mainly the combustion of fossil fuels (Figure 3). Decarbonizing the power sector is key to the energy system transition. If increasingly grave risks are to be avoided, decarbonizing the power sector will require the sustained rapid growth of renewable electricity and significant reductions in coal-fired and gas-fired generation at a global level over the next 10 years (Grant & Coffin, 2019, pp. 38-41; Chang, 2020).

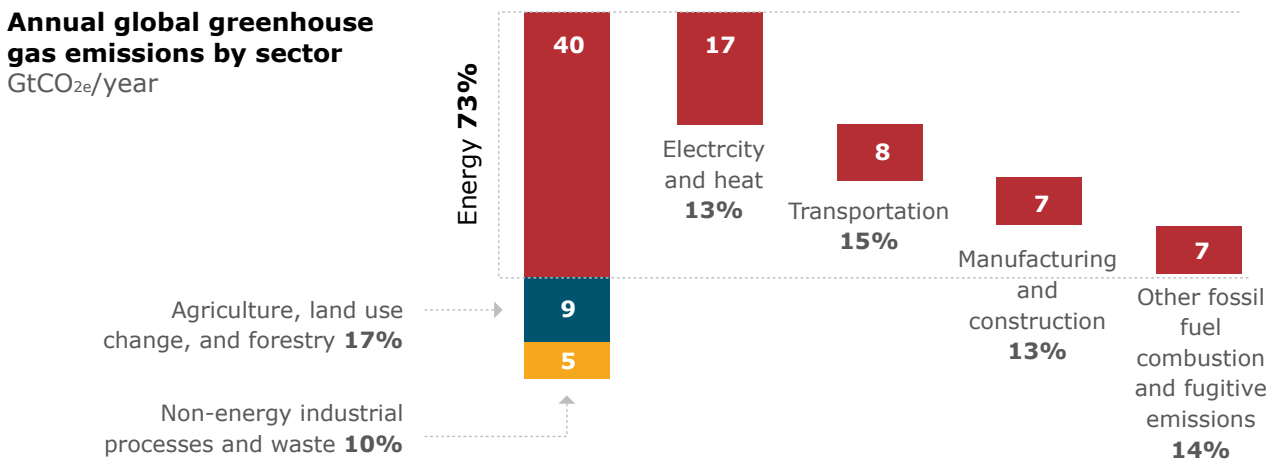


Figure 3: Annual global GHG emissions by sector based on recent historical data (Ørsted, 2020).

The deep decarbonization of the power sector is a robust outcome of all modeled scenarios that limit warming to 1.5˚C in the IPCC's Special Report on 1.5˚C. Sector emissions are reduced by 70%-92% between 2020 and 2035, approaching zero by around 2040-2045 (Figure 4). Other characteristics of the power sector transition show more variation across scenarios, like growth in electricity generation, the sector's mix of primary energy sources, and the sector's deployment of bioenergy carbon capture and storage (BECCS).

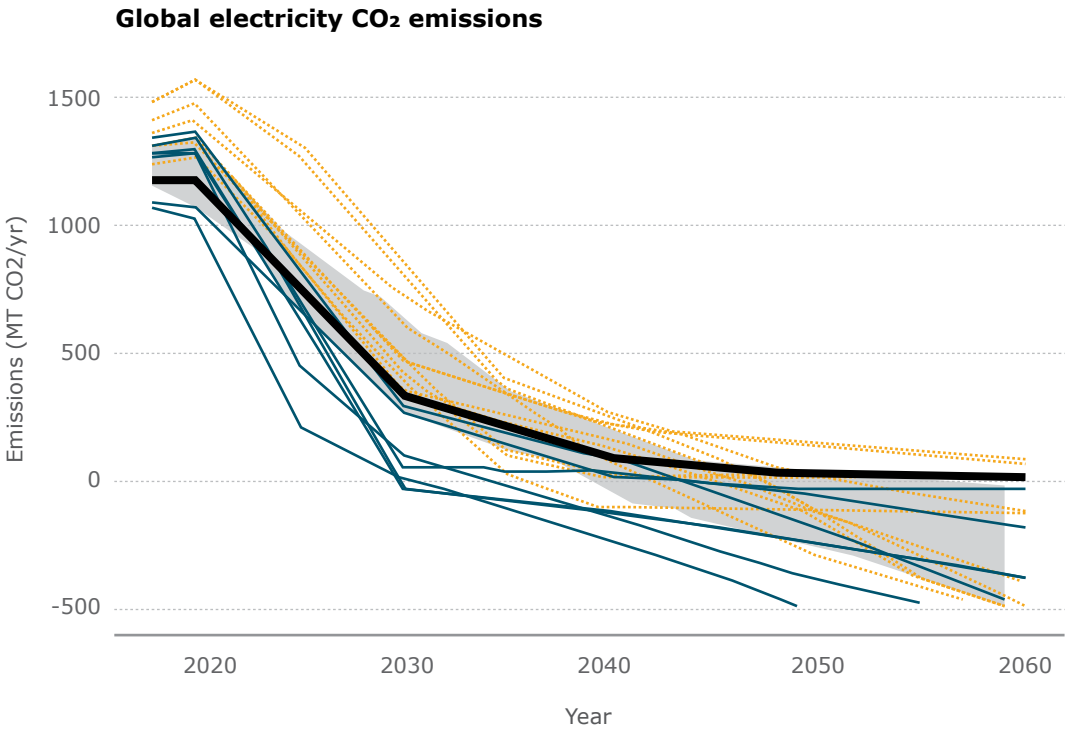


Figure 4: Global emissions from electricity generation. Interquartile range of all 1.5°C low/no-overshoot scenarios (gray shaded area), SBTi 1.5°C power pathways (blue), and excluded pathways (orange). Black line is MESSAGE-GLOBIOM Low Energy Demand scenario

Guiding near-term action

To determine minimum ambition, modeled scenarios used by the SBTi should be plausible, consistent, responsible, and objective relative to the desired goal of limiting warming to 1.5˚C or well-below 2˚C (Science Based Targets initiative, 2019). Not all scenarios meet these criteria, some show limited near-term GHG emissions reductions due to the assumed future deployment of CO2 removal (CDR) technologies, which are associated with significant risks and uncertainties. These scenarios should not be used for SBT-setting purposes. Ultimately, a set of 20 pathways for the power sector are found to comply with SBTi principles (Supplementary Material 1) and are considered valid for target setting with the Sectoral Decarbonization Approach (Krabbe, et al., 2015).

At a minimum, SBTi power sector pathways aligned with 1.5˚C approach zero emissions around 2040. These pathways are characterized by 2020-2035 reductions greater than the median of all low and no-overshoot scenarios in the IPCC's Special Report on Global Warming of 1.5˚C. Higher near-term ambitions reflects that many excluded scenarios rely on CDR beyond what is known to be feasible to balance unmitigated emissions and reduce atmospheric CO2 from 2040 onward. Regardless, the SBTi's power sector pathways are consistent with a range of electricity growth trajectories (Figure 4). The MESSAGE-GLOBIOM Low Energy Demand scenario is well-documented and establishes the minimum ambition emissions reduction pathway for the sector. The scenario depicts about 30% growth in electricity generation between 2020 and 2035. Combined with the emissions pathway, this is equivalent to an 85% reduction in emissions intensity between 2020 and 2035. After 2035, the MESSAGE-GLOBIOM Low Energy Demand scenario leads to an emissions intensity of approximately zero by 2050 (the convergence year for the SBTi's Sectoral Decarbonization Approach [SDA] method). Some other scenarios continue downward emissions trends, resulting in negative emissions for the sector in the second half of the century.

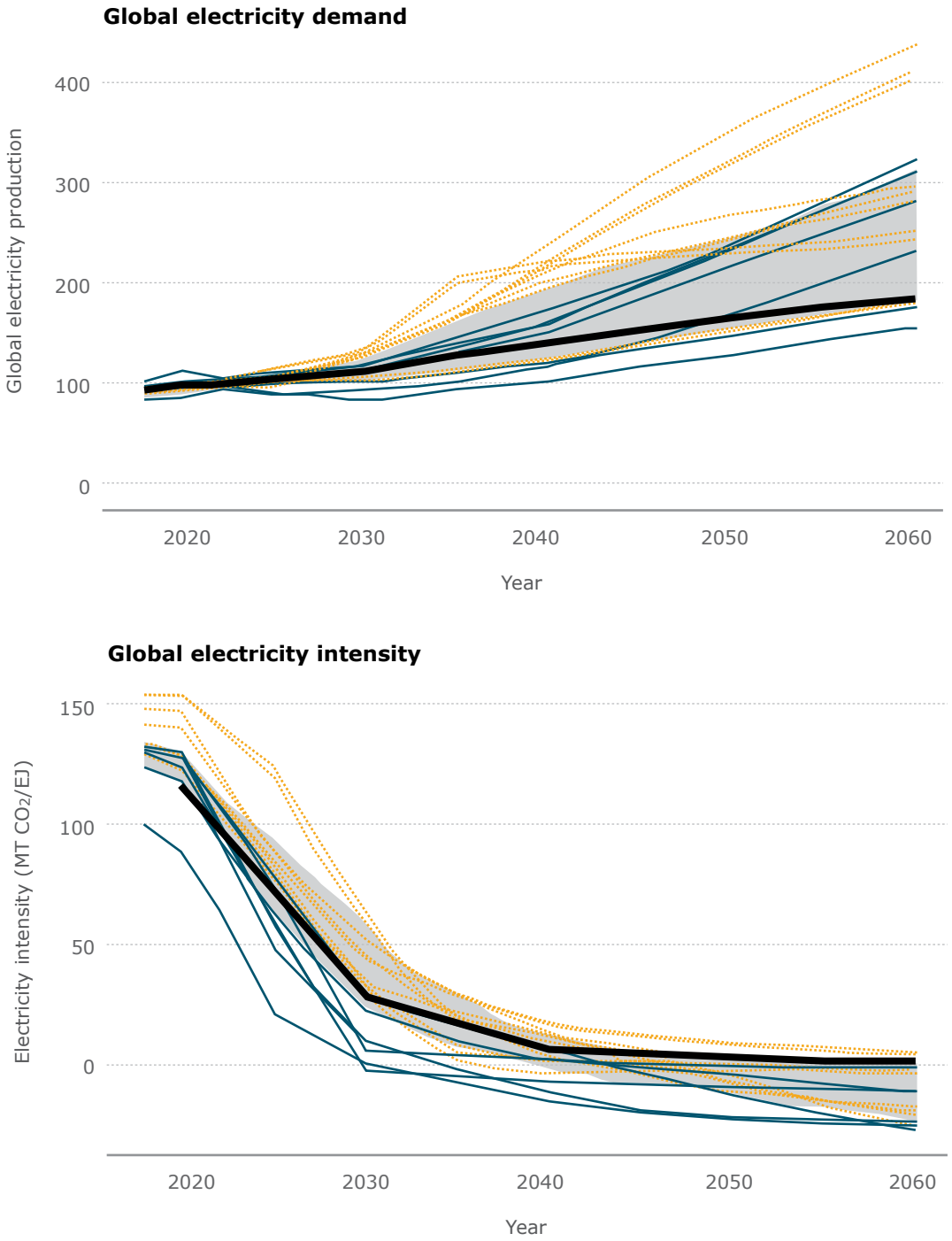


Figure 4: Global electricity generation (top) and emissions intensity of electricity (bottom). Interquartile range of all 1.5°C low/no-overshoot scenarios (gray shaded area), SBTi 1.5°C power pathways (blue), and excluded pathways (orange). Black line is MESSAGE-GLOBIOM Low Energy Demand scenario

The role of carbon dioxide removal

Even if all countries' GHG emissions targets pledged under the Paris Agreement (i.e., Nationally Determined Contributions) were met 5 years early, CDR would still be needed to limit warming to 1.5˚C in 2100 (Holz, Siegel, Johnston, Jones, & Sterman, 2018). Therefore, CDR technologies should be further developed in parallel with the rapid transformation of power generation. In the energy sector, CDR technologies may include BECCS and direct air capture; nature-based solutions such as afforestation and reforestation also can be used. The SBTi is developing guidance on how companies can set targets that incorporate removals beyond the scope of traditional SBTs, which will be reflected in its Net-Zero Criteria and Guidance. At this time, no SBTs are expected to result in negative emissions.

HOW TO SET A SCIENCE-BASED TARGET

This section provides step-by-step, practical guidance for electric utilities on setting SBTs. Four steps are described:

1. **Calculate emissions inventory.** Calculate base year and most recent year emissions inventories and activity (e.g., electricity generated) following guidance provided by the GHG Protocol.

2. **Determine target scope and approach.** Review the SBTi criteria and use the Power Generation SDA Applicability Matrix (Table 1) to determine how to set SDA target(s) across relevant activities and scopes.

3. **Construct targets.** Model SDA target(s) using the SBTi Tool. Additional targets may also be needed to address emissions not applicable to the Power Generation SDA to meet the SBTi criteria and can be modeled with the SBTi Tool.

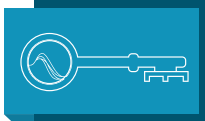
4. **Submit targets to SBTi.** Send a completed Target Submission Form to the SBTi.

Step 1: Calculate emissions inventory

Before a company sets a target, it should develop a comprehensive GHG emissions inventory for its target base year following GHG Protocol guidelines. In addition to ensuring general alignment with the GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), companies are instructed to review "Appendix A: Accounting for Indirect Emissions from Electricity" and the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions, with a focus on "Category 3: Fuel- and Energy-Related Activities Not Included in Scope 1 or Scope 2." Companies with combined heat and power (CHP) activities should also refer to "Allocation of GHG Emissions from a Combined Heat and Power (CHP) Plant."

Step 2: Determine target scope and approach

As a company's carbon footprint can be extensive, companies should focus efforts on key categories within their footprints. The SBTi offers recommendations for defining the target scope and has a detailed set of criteria that it uses for assessment. See Box 1 for more information.



BOX 1: KEY SBTI CRITERIA AND RECOMMENDATIONS V4.1

The company should develop its SBT using the SBTi Criteria and the Target Validation Protocol.[1]
The most relevant criteria for electric utilities are shared in the following list, but this is not exhaustive.

C2 – SIGNIFICANCE THRESHOLDS: *Companies may exclude up to 5% of scope 1 and scope 2 emissions combined in the boundary of the inventory and target.*

C4 – BIOENERGY ACCOUNTING: *Direct emissions from the combustion of biomass and biofuels, as well as GHG removals associated with bioenergy feedstock, must be included alongside the company's inventory and must be included in the target boundary when setting a science-based target and when reporting progress against that target. If biogenic emissions from biomass and biofuels are considered climate neutral, the company must provide justification of the underlying assumptions. (GHG removals that are not associated with bioenergy feedstock are currently not accepted to count as progress towards SBTs or to net emissions in the inventory.)*

C5 – BASE AND TARGET YEARS: *Targets must cover a minimum of 5 years and a maximum of 15 years from the date the target is submitted to the SBTi for an official validation.*

R3 – BASE YEAR: *The SBTi recommends choosing the most recent year for which data are available as the target base-year.*

C8 – LEVEL OF AMBITION: *At a minimum, scope 1 and scope 2 targets will be consistent with the level of decarbonization required to keep global temperature increase to well-below 2°C compared to preindustrial temperatures, though companies are encouraged to pursue greater efforts towards a 1.5°C trajectory.*

C17 – REQUIREMENT TO HAVE A SCOPE 3 TARGET: *If a company's relevant and mandatory scope 3 emissions are 40% or more of total scope 1, 2, and 3 emissions, a scope 3 target is required. […]*

C18 – BOUNDARY: *Companies must set one or more emissions reduction targets and/or supplier or customer engagement targets that collectively cover(s) at least 2/3 of total scope 3 emissions […]*

*C20.2 – FOSSIL FUEL SALE, TRANSMISSION AND DISTRIBUTION: *Companies that sell, transmit, or distribute natural gas or other fossil fuel products shall set absolute or intensity percentage-based emissions reduction scope 3 targets for the use of sold products [irrespective of the share of these emissions compared to the total scope 1, 2, and 3 emissions of the company. …]*

1 At the time of publishing, the most recent available set of SBTi criteria is version 4.1; however, target submissions in line with version 4.0 of the SBTi criteria are accepted until July 15th, 2020. Criteria are updated on an annual basis between January and March.

There are a variety of target-setting approaches endorsed by the SBTi, but each approach's applicability is subject to sector, scope, and activity-specific requirements. These approaches are described for electric utilities in the following section.

SBT approaches for the power sector

The SDA is a method for setting physical intensity GHG reduction targets that align with the sectoral pathway of an underlying climate change mitigation scenario. Emissions intensity targets are defined by a reduction in emissions relative to a specific business metric, such as production output of the company (in this case, kg CO2e per kWh). A central principle of the SDA is that all companies in a sector must converge to a certain emissions intensity by a chosen year, specified to be 2050.

As Figure 5 shows, emissions converge to zero or a negative intensity in the power sector; however, the SBTi does not currently prescribe any negative targets and defers its assessment of targets that include CO2 removals to its forthcoming net-zero criteria and guidance. Because the path to 1.5˚C is not linear, companies that apply the Power Generation SDA pathway need to reduce emissions most rapidly over the next decade relative to historic emissions intensity levels. Companies that generate power must use the SDA to model targets on emissions from power generation.

The absolute contraction approach is used to set targets on emissions that cannot be addressed using the SDA. Absolute contraction targets are expressed as a percentage emissions reduction achieved between a base year and a future target year, without directly incorporating changes in a company's production output. Companies should use the SBTi's target-setting tool to model SDA and absolute contraction targets at any of the ambition levels accepted by the SBTi.

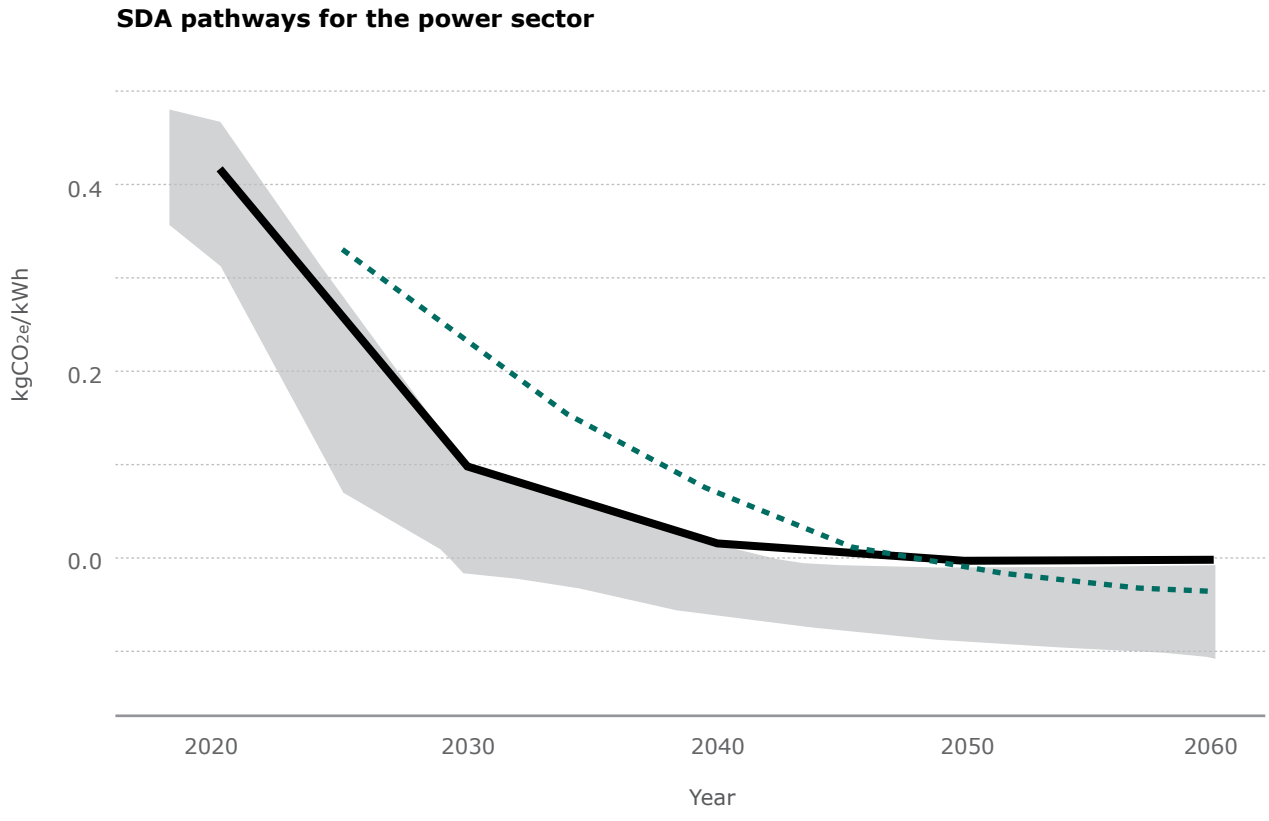


Figure 5: SDA pathways for the power sector aligned with 1.5°C (black line and shaded area) and well-below 2°C (dashed green line) based on IEA ETP B2DS with GHG emissions intensity on the y-axis.

Applicability of pathway and method

Because electricity generation is the primary source of emissions in the power sector, this guidance focuses on 1.5˚C-aligned options for electricity generation expressed in terms of CO_2e emissions per kWh. Commercial heat generation, including CHP, is also addressed. The resulting pathway is directly applicable to companies that generate electricity or electricity and commercial heat and is a starting point for exploring 1.5˚C-aligned pathways across other sectors.

Depending on the utility, emissions associated with power generation may be accounted for in scopes 1, 2, or 3. For companies generating power, the SDA must be used to model targets covering electricity generation-related emissions within the organizational boundary, as well as generation-related emissions associated with all sold electricity. Emissions not associated with electricity should be addressed by the company's SBT (if applicable) but may be modeled using a different target-setting method. Transmission and distribution (T&D) companies that do not generate electricity are not required to fulfill power sector-specific criteria and should defer primarily to the SBTi's general requirements.

Table 1 summarizes how the Power Generation SDA should be applied by electric utilities involved with different activities. The table should be used after an emissions inventory has been calculated and criteria C2 and C17 have been observed. Step 3 provides several examples to demonstrate how the Power Generation SDA pathway can be applied.

ACTIVITY		EMISSIONS SCOPE	SDA NUMERATOR (EMISSIONS)	SDA DENOMINATOR (ACTIVITY)	APPLICABILITY TO ORGANIZATIONAL BOUNDARY SDA TARGET	APPLICABILITY TO ALL SOLD ELECTRICITY SDA TARGET
Power generation in organizational boundary	Electricity	Scope 1	GHG emissions generated	MWh electricity generated	Required	Required
	CHP-derived heat	Scope 1	GHG emissions generated	GJ heat sold	Optional	Optional
	Other heat	Scope 1	GHG emissions generated	GJ heat sold	Optional	Optional
Purchased electricity	Own use	Scope 2	GHG emissions calculated with location or market-based factor	MWh electricity purchased	Optional	Optional
	Electricity that is purchased and sold	Scope 3 category 3	GHG emissions calculated with location or market-based factor	MWh electricity purchased	N/A	Required

Table 1: Power Generation SDA Applicability Matrix. The company should only report one SDA target covering power generation in the organizational boundary and, if applicable, one SDA target covering all sold electricity. The emissions intensity associated with each target is calculated based on the sum of relevant emissions in the SDA numerator column divided by the sum of relevant activity in the SDA denominator column. For purchased electricity, emissions must be calculated using the location-based or market-based approach.1 Companies that generate heat have the option of including heat-related emissions in SDA target(s) with electricity or in a separate absolute contraction target.

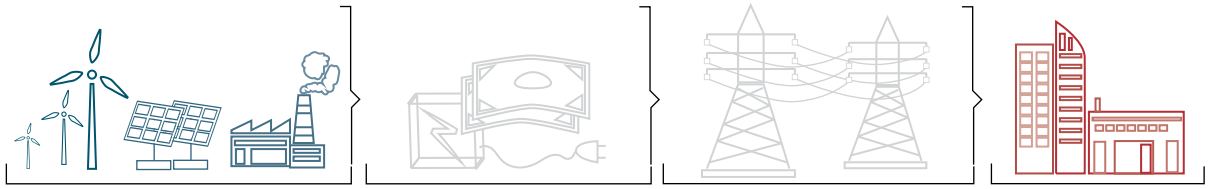
1 GHG Protocol, Scope 2 Guidance: The location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emissions factor data). The market-based method reflects emissions from electricity that companies have purposefully chosen (or their lack of choice). It derives emission factors from contractual instruments, which include any type of contract between two parties for the sale and purchase of energy bundled with attributes about the energy generation, or for unbundled attribute claims.

Step 3: Construct targets

Targets should be calculated using the SBTi Tool. This section provides four examples that demonstrate how different types of electric utilities can model targets using the tool.

Example 1: Company generating electricity

A power utility with no cogeneration/CHP capacity, no sale or distribution of thermal energy.



SCOPE 1: electricity generation (in organizational boundary) | NA | NA | **MARKET**

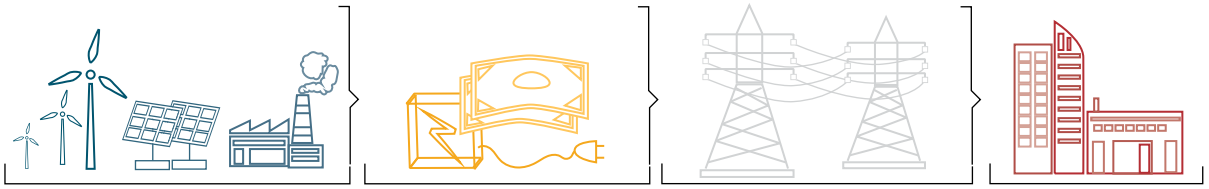
An SDA target must be constructed that covers scope 1 emissions from fuel combustion for electricity generation. Scope 2 emissions associated with electricity for the company's own use must either be included in the SDA target boundary or addressed separately using absolute contraction. If other scope 1 or 2 emissions are significant (e.g., combustion of fuel for transportation) it is best for them to be addressed separately using absolute contraction; however, because the Power Generation SDA typically results in more ambitious emissions reduction targets (in aggregate) than absolute contraction, companies may include all scope 1 and 2 emissions in the SDA target if desired.

When an electricity generation company's scope 3 emissions exceed 40% of total scope 1, 2, and 3 emissions, it must also address these emissions using an SBTi target-setting method. Otherwise, scope 3 emissions may be optionally covered with the exception of sold and distributed fossil fuels, which must be covered by a target.

To set a target using the SDA method, the amount of electricity generated must be defined in the base year and estimated in the target year. The SBTi Tool then provides a calculation of the company's target in absolute emissions and emissions intensity (kg CO2e/MWh).

Example 2: Company generating and purchasing electricity

A power utility generating and purchasing electricity with no cogeneration/CHP capacity, no sale or distribution of thermal energy



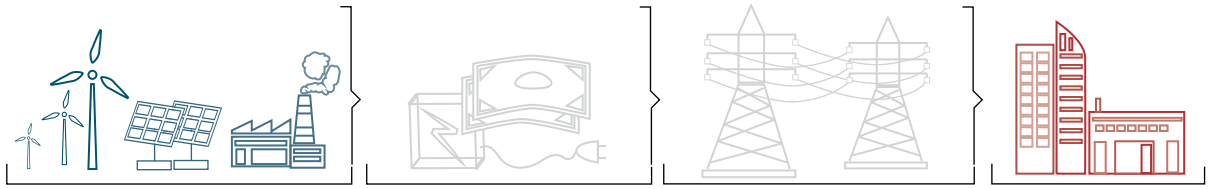
SCOPE 1: electricity generation (in organizational boundary) | **SCOPE 3 CATEGORY 3: electricity purchased** | NA | **MARKET**

Two SDA targets must be constructed: one target covering scope 1 emissions from fuel combustion for electricity generation (same as Example 1), and the other target covering the sum of generation-related emissions in scope 1 and scope 3 category 3 (i.e., all sold electricity). In the target covering all sold electricity, emissions intensity is calculated

by dividing the sum of generation-related emissions in scope 1 and scope 3 category 3 by total electricity, which is the sum of electricity generation in the organizational boundary and electricity purchased to be sold to customers. Emissions intensity should be calculated for the base year and estimated for the target year. Companies may use the location-based or market-based approach to calculate emissions associated with purchased electricity.

Example 3: Company generating electricity and commercial heat:

A power utility that has cogeneration capacity and/or controlling heat plants



This example is similar to Example 1, but with a notable exception that it allows the operation of CHP or commercial heat plants. As some utilities reuse and commercialize heat from all or part of their power generation assets, this approach is designed to enable companies to set SBTs inclusive of heat and to recognize the improved efficiency of CHP.

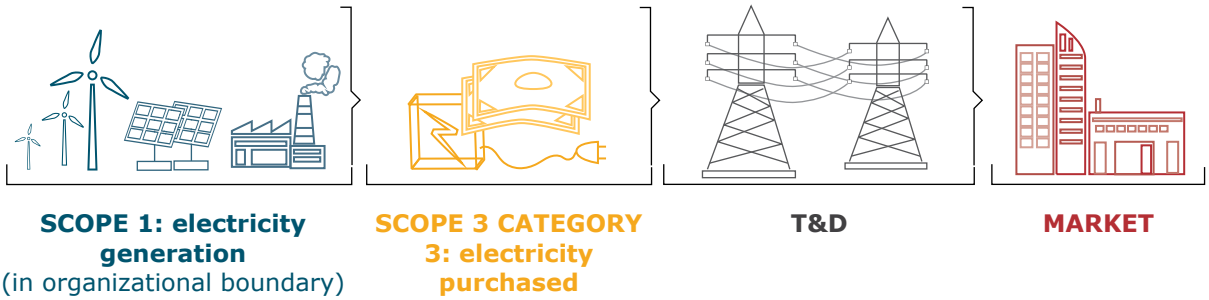
Companies that match this example have two options for setting targets:

A. **Set separate targets on electricity generation and commercial heat:** Emissions allocated to electricity generation must be covered by an SDA target and emissions allocated to commercial heat must be addressed by absolute contraction.

B. **Develop a combined target:** The sum of emissions associated with electricity and heat generation is covered by a combined SDA target using an emissions intensity metric based on total power generation in megawatt-hours (i.e., the sum of electricity generated and commercial heat sold).

Example 4: Vertically integrated power company (including T&D activities)

A power utility generating and purchasing electricity with no cogeneration/CHP capacity, and with T&D activities.



Vertically integrated electric utilities may set targets following a similar approach as Example 2. For any power generated by the company, emissions associated with electricity lost in T&D are implicitly included in scope 1. For power purchased to be sold to customers, emissions associated with electricity lost in T&D are generally included

in scope 3 category 3. In the target covering all sold electricity, emissions intensity is calculated by dividing the sum of generation-related emissions in scope 1 and scope 3 category 3 by total electricity, which is the sum of electricity generation in the organizational boundary and electricity purchased to be sold to customers. Emissions associated with purchased electricity should be calculated based on location or market-based emissions factors. Similar to Example 2, an SDA target must also be set that covers scope 1 emissions from fuel combustion for electricity generation and that excludes emissions in scope 3.

It is recommended that companies that own T&D place special emphasis on reducing scope 1 emissions of the GHG sulfur hexafluoride (SF6), which is used in distribution systems, in addition to decarbonizing power generation.

Step 4: Submit targets to SBTi

To apply for an SBTi-approved target, the company must complete the Target Submission Form and email it to targets@sciencebasedtargets.org. Submissions are validated against the SBTi Criteria and SBTi Target Validation Protocol. Each approved target also receives a target classification of 1.5˚C or well-below 2˚C. For electric utilities, the target classification is determined by the level of ambition of the SDA target covering emissions from power generation in the organizational boundary.

The SBTi's paid target validation service offers at least two submissions and up to 2 hours of feedback on calls with reviewers on the Target Validation Team. Details regarding this service and associated fees are available on the SBTi website.

ADDITIONAL RESOURCES

It is recommended that companies subscribe to the SBTi mailing list and regularly check the website for planned updates to SBTi resources. Companies may also find it useful to review targets that have already been approved by the SBTi, which are published on the SBTi's website. Stakeholders are encouraged to refer to third-party resources with increased geographic or sectoral resolution as practical tools to assist in target planning and implementation.

EFFECTIVE DATES OF SECTOR-SPECIFIC REQUIREMENTS

The newly introduced requirement for electric utilities that generate electricity to set a Power Generation SDA target on all sold electricity, if applicable, will be in effect as of January 1, 2021. All submissions received by the SBTi prior to January 1, 2021 can be assessed with or without a Power Generation SDA target on all sold electricity, although doing so is encouraged.

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