

White Paper: Scope 2 Emissions & Strategies for Reduction

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info@vitalmetrics.com

www.vitalmetrics.com

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Authors




Kate Shoemaker
Analyst



Ilayda Dinc
Head of Innovation

Introduction

As a growing number of organizations measure and reduce their emissions, the Greenhouse Gas (GHG) Protocol has outlined three scopes which are used to categorize emissions into direct (Scope 1) and indirect (Scope 2 and 3) emissions.¹ Companies can use these categorizations to understand where their emission hotspots are and how they can implement effective reductions. Scope 2 emissions, indirect emissions from a company's purchased electricity, steam, heat, or cooling, represent a large source of GHG emissions for many companies; however, they are often overlooked as an area where reductions can take place.¹ Scope 2 accounts for at least a third of global GHG emissions and therefore contains a high potential for emissions reduction.² Although Scope 2 emissions are considered 'indirect' emissions, companies can still have a lot of control over them through the intentional selection of energy sources. Additionally, with changes to the electricity market such as deregulation, growth of renewables, and new market-based instruments, companies now have more options to reduce Scope 2 emissions. Through measuring and reducing Scope 2 emissions, companies can better understand the risks and opportunities associated with changing electricity and GHG emissions costs. Understanding the various levers to reduce Scope 2 emissions is vital in any organization's climate action plan. Companies like AstraZeneca, Amazon, and Google have set ambitious goals to reduce their Scope 2 emissions through the creative use of market-based instruments, along with increased efficiency and reduced energy use. While understanding that each company is unique, this article outlines the nature of Scope 2 emissions and highlights key strategies to reduce them.



Although Scope 2 emissions are considered 'indirect' emissions, companies can still have a lot of control over them through the intentional selection of energy sources.



What Are Scope 2 Emissions? Location-Based vs. Market-Based

The Greenhouse Gas Protocol Corporate Standard requires organizations to quantify emissions from the generation of acquired and consumed electricity, steam, heat, or cooling (collectively referred to as “electricity”). These emissions are termed “Scope 2” and are considered an indirect emissions source because the Scope 2 emissions are a consequence of activities of the reporting organization but actually occur at sources owned or controlled by another organization.¹ Figure 1 illustrates the difference between Scope 1 emissions (direct) and Scope 2 emissions (indirect). Electricity consumers have significant opportunities to reduce those emissions by reducing electricity demand and increasingly play a role in shifting energy supply to alternative low-carbon resources.

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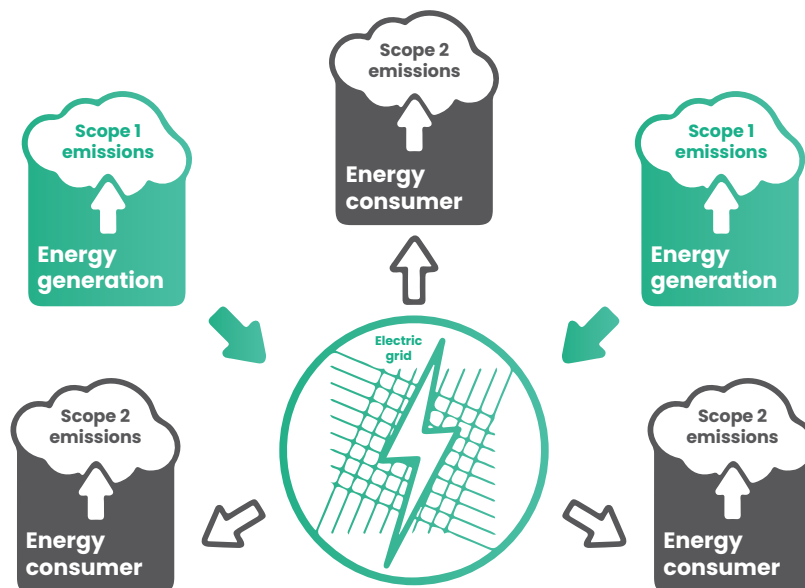


Figure 1. Electricity distribution on the grid, Scope 2 emissions are from energy consumer.¹

In 2015, the GHG Protocol published the Scope 2 Guidance, which outlined new requirements for accounting for emissions from market-based instruments like energy contracts and renewable energy certificates.¹ It also highlighted eight Scope 2 Quality Criteria that all contractual instruments must meet in order to be a reliable data source for the Scope 2 market-based emissions method.¹ In this new guidance, organizations that exist in markets with options for energy contracts must report their Scope 2 emissions using two methods, the location-based method, and the market-based method.

Location-Based

The location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data).¹ This energy consumption is not purposefully chosen but rather based on the location and the subsequent grid mix in that region.

Market-Based

The market-based method reflects emissions from the 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.¹ Markets differ as to what contractual instruments are commonly available or used by companies to purchase energy or claim specific attributes about it, but they can include energy attribute certificates (renewable

energy certificates, Guarantees of Origin, etc.), direct contracts (for both low-carbon, renewable, or fossil fuel generation), supplier-specific emission rates, and other default emission factors representing the untracked or unclaimed energy and emissions (termed the “residual mix”) if a company does not have other contractual information that meets the Scope 2 Quality Criteria.¹

The GHG Protocol requires companies to report both location and market-based emissions for a few important reasons. First, so organizations can distinguish between purchasing choices versus changes in grid emissions intensity in their reduction targets.¹ Second, it provides transparency for stakeholders and improves comparability across operations.

Strategies to Reduce Scope 2 Emissions

Once companies obtain a holistic view of their emissions and report them, they can create a plan for reductions. We outline reduction strategies and market-based instruments in the following sections. Although this section focuses on market-based instruments, a holistic emissions reduction strategy should also include overall energy reductions and efficiency of operations.

Generate Renewable Energy

Owning and generating renewable energy onsite through solar or wind energy is an effective solution to reduce emissions. These projects show a clear commitment to clean energy and can demonstrate the impact of direct emissions reductions. These projects require an upfront capital investment, but they result in reduced electricity costs down the road and can keep the company insulated from changing energy costs.³ For some companies with the capacity and financial ability, producing their own renewable energy could be a good solution to reduce their purchased electricity and ensure they have consistent, clean power for their facilities. Other considerations include where the facility is located, as access to renewable resources can impact the plausibility of these projects. In some cases, companies will choose to build an off-site project if an on-site project is not feasible, in which the project is built off-site but is either connected to the facility by a direct line or it is not located near the facility, and the renewable energy is transported to the facility by the grid.³ Because the company has financial control over the site, it owns the renewable energy certificates associated with the renewable energy generated.³ Off-site options have similar benefits to on-site; however, they require a greater level of planning and complexity in most cases. Both options have a high impact because the investment directly results in a new renewable power project.

Purchase Energy Attribute Certificates

Another option to reduce Scope 2 emissions is to purchase energy attribute certificates. Energy attribute certificates are a category of contractual instrument that represents certain information about the energy generated but does not represent the energy itself.¹ This includes a variety of instruments with different names, including certificates, tags, credits, or generator declarations. In Europe, these certificates are called Guarantees of Origin (GOs), and in the US, they're called Renewable Energy Certificates (RECs).¹ For the purposes of this paper, we will refer to RECs to describe energy attribute certificates.

RECs represent proof that one megawatt-hour of electricity was generated from a renewable energy source and fed into the grid.⁴ When you purchase RECs, you make it possible for more clean energy projects to supply power to the grid in which they operate. Purchasing RECs can contribute to a reduction of carbon emissions by increasing renewable energy on the grid.⁴

RECs can be “bundled,” where they are sold with the underlying electricity, or “unbundled,” where they are sold separately from the underlying electricity.⁵ Although purchasing bundled RECs is generally accepted as a more effective means of bringing renewable energy to the grid, unbundled RECs can be sold nationally and are therefore a good option for companies with facilities in areas with regulated electricity markets.⁵

RECs can be purchased directly from renewable energy project developers, conveyed through a power purchase agreement, or bought through a broker.¹ To make claims that you are reducing Scope 2 emissions, you must buy RECs that haven't been purchased before, and you must "retire" those RECs, which means that you hold them forever and don't sell them to anyone else.¹

Green-e provides a list of projects that sell RECs that are certified by the organization, which means that they have not been sold more than once or claimed by more than one party.¹ Figure 2 outlines the pathway for a REC, illustrating the difference between unbundled and bundled RECs.

Figure 10.1 Energy attribute certificate pathways

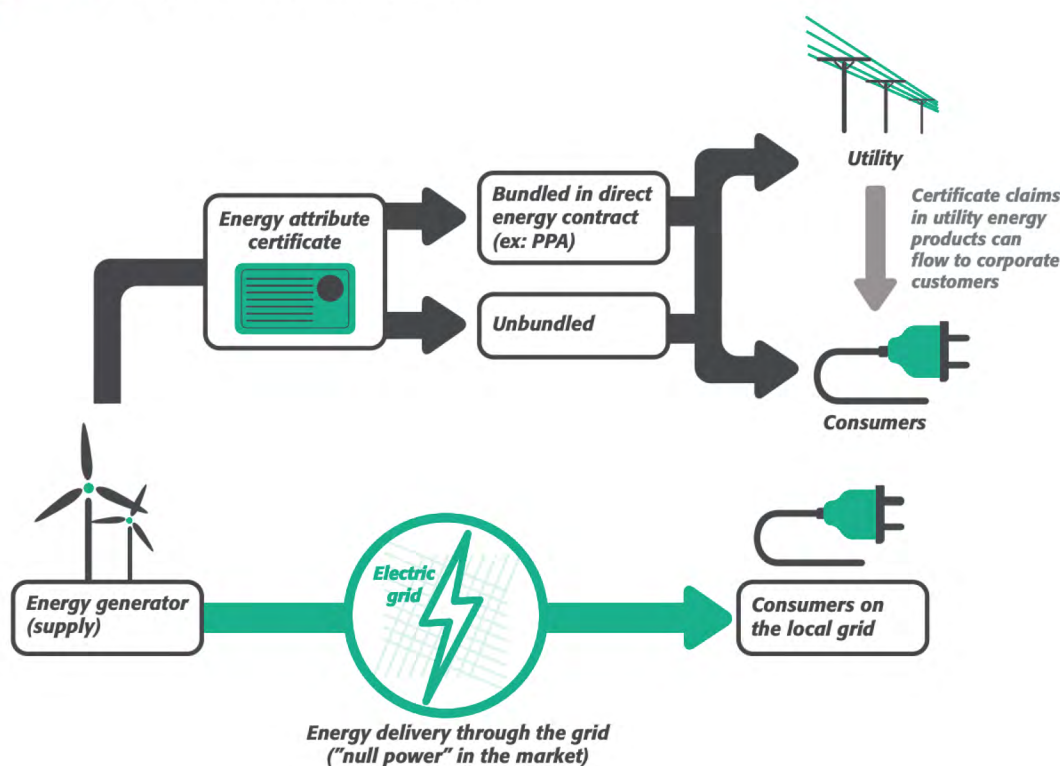


Figure 2. GHG Protocol Scope 2 Guidance energy attribute certificate pathways.¹

Enter Into Direct Contracts Like Power Purchase Agreements

A Power Purchase Agreement (PPA) is a long-term contract where a business agrees to purchase electricity directly from a renewable energy generator.⁶ These contracts allow companies to lock in prices of renewable energy, allowing for the long-term development of a renewable project and allotted usage of that energy.⁵ There are two kinds of PPAs, physical and financial.

In a physical PPA, companies receive the physical delivery of electricity from the renewable energy generator it is in contract with through the grid.⁷ Physical PPAs can be on-site or offsite. An on-site project is constructed on the company's property but financed, developed, and maintained by the renewable energy generator.⁷ An off-site project is not on the company property but still in the grid region, and electricity can flow directly to the company facility.⁷ It is also important to note that the company must own the associated project RECs in order to make claims about using renewable power from the project.⁷ Physical PPAs allow for long-term electricity cost stability and predictability and require no up-front capital costs. A consideration with physical PPAs is understanding if a company's facilities are located in competitive electricity markets and the same grid region as the generation facility (if an off-site project).

Alternatively, in a financial PPA, physical electricity is not delivered from generator to buyer, but rather the renewable energy generator will sell the energy to the grid at the floating market price.⁸ The generator and buyer have created an agreement where they've decided on the price per kilowatt-hour, which the buyer will pay the generator for the electricity it puts onto the grid.⁸ If the electricity sells for more or less than the agreed-upon price, the monetary difference is exchanged between the two parties. The RECs associated with the renewable energy generated are usually contractually given to the buyer in a financial PPA.⁸ Financial PPAs give the customers a less volatile cost of electricity and can be a good option for companies with facilities spread out through different regions.⁸

Participate in Utility Green Tariffs

Utility green tariffs can be a good option for companies in regulated energy markets where a company cannot participate in a PPA. Utility green tariffs allow larger commercial and industrial customers to buy bundled renewable electricity from a specific project through a special utility tariff rate.⁵ Since these agreements are based off renewable energy that is already being produced, these green tariffs do not have as much of an impact on bringing new renewable energy projects online and therefore are not as effective as other reduction options.⁹ In some cases, the utility procures a long-term contract with the third-party green power generator and allows multiple customers to sign up for a portion of the project.⁹ This can lessen the complexities associated with negotiating terms and contracts.⁹ Green tariffs can be a good solution in regions where retail access to generators is not authorized.⁵

Companies Reducing Their Scope 2 Emissions

Many companies are aiming to reduce Scope 2 emissions, and we will look at three case studies where companies use a combination of the above tools to reduce Scope 2 emissions.



AstraZeneca is a global biopharmaceutical company that discovers and develops prescription medicines that are used worldwide by millions of people. AstraZeneca released its seventh sustainability report in 2022, in which sustainability progress to date and goals for the future were outlined. Specifically for environmental goals, AstraZeneca plans to reduce greenhouse gas emissions from its global operations (Scope 1 and 2) by 98% by 2026 and halve its entire value chain footprint (from the 2015 baseline) by 2030 on the way to a 90% reduction by 2045 (from 2019 baseline).¹⁰ The Science Based Targets initiative (SBTi) verified these goals, making AstraZeneca was one of the first seven companies worldwide to have its net zero, science-based Scope 1-3 targets verified under their new Net-Zero Corporate Standard.¹⁰

AstraZeneca's approach to reducing Scope 2 emissions combines a number of the instruments outlined above. First, it aims to decouple energy consumption from business growth and achieve absolute reductions in total energy consumed, while doubling energy productivity from its 2015 baseline through continued investment from the Natural Resources Efficiency Fund.¹⁰ By 2026,

AstraZeneca aims to see a 98% reduction of Scope 1 and 2 emissions from their 2015 baseline.¹⁰ To achieve this goal, it plans to substitute 100% of site energy consumption with renewables through on-site solar PV and off-site power purchase agreements.¹⁰ It has committed \$20 million over 2020-2023 in on-site solar PV installations at six sites in five countries; these sites will produce enough energy to cover 2% of imported electricity needs.¹⁰ It will meet the rest of its energy needs through PPAs. Its 2021 progress states a 59% reduction in Scope 1 and 2 reductions, including a 9% reduction in energy consumption.¹⁰ AstraZeneca is a great example of utilizing on-site renewable projects as well as PPAs to reduce Scope 2 emissions.



Amazon is another company that has set ambitious goals to reach net zero by 2040. Specifically, for Scope 2, it's on a path to powering its operations with 100% renewable energy by 2025.¹¹ In 2020, Amazon became the world's largest corporate purchaser of renewable energy, and in 2021, it reached 85% renewable energy across its business.¹¹ As of 2021, Amazon has added 232 solar and wind projects throughout the world, and these helped power 24 million megawatt hours of electricity used by Amazon in 2021 and reduced their Scope 2 emission by 23%.¹¹ Amazon uses a mix of off-site contracts, green tariffs with local utilities, as well as on-site and off-site generation. Additionally, Amazon focuses on overall emissions reductions through their buildings with a focus on energy efficiency

enhancements, sustainable building materials, and new technologies to lower demand.¹¹ Amazon Web Services' infrastructure is 3.6 times more energy efficient than the median of surveyed U.S. enterprise data centers and up to five times more energy efficient than the average European enterprise data center.¹¹ In 2021, Amazon brought renewable energy projects online across 18 different countries, some of these being the first projects of their kind in countries like South Africa and Japan. It also announced its largest renewable energy project in Europe, which will bring 3.5 GW of renewable energy onto the grid in Europe.¹¹

Amazon is a great example of a company that is using a number of market-based instruments like PPAs, on-site and off-site renewable generation, and green tariffs, mixed with an overall reduction in usage to reduce Scope 2 emissions.



Google is catalyzing the transition to a carbon-free and circular economy, and as of 2020, it has entered into its third decade of climate action.¹³ In its latest sustainability report, one ambitious goal was to “become the first major company to run on carbon-free energy 24 hours a day, seven days a week, 365 days a year”.¹³ To achieve this goal, Google will utilize a combination of market-based instruments such as RECs, PPAs, and Utility tariffs, along with overall energy use reduction from alternative energy sources to efficiency initiatives. Google has significantly increased the efficiency of its operations

and decreased its overall usage. Google's data centers are now twice as efficient and use 6 times less overhead energy than the average enterprise data center.¹³ Through these efficiency and reduction measures, Google has been able to significantly reduce overhead energy and subsequently reduce costs on RECs and offsets.¹³

Another way Google is reaching its carbon-free goal is by building alternative energy sources to run its operations. One example is “Dragonscale,” an innovative solar panel roof design that integrates form and function to optimize light captured through its prismatic design.¹⁴ These innovative roofs are found at two Google locations and are estimated to supply about 40% of energy demands at both facilities.

Through creative design, Google has significantly reduced its electricity demand and subsequently lowered Scope 2 emissions. For the remainder of its Scope 2 emissions, Google used renewable energy PPAs.



Table 1.
Market-based instruments used by companies

		Market-Based Instruments Used			
		PPA	RECs	Renewable generation	Green Tariffs
Company	AstraZeneca	✓	✓	✓	
	Amazon	✓	✓	✓	✓
	Google	✓	✓	✓	✓

Conclusion

Scope 2 emissions continue to play a large role in the carbon footprint of companies around the world, and companies have increasing control around where they source their electricity.² Understanding the quantity and underlying nature of your company's Scope 2 emissions is essential for a thorough emissions reduction plan. As more market-based instruments become available, the ability to procure green energy and customize that approach to your specific company's goal is more feasible. Additionally, as companies prioritize purchasing renewable energy, the overall demand and financial backing for these projects increases, thus accelerating the decarbonization of the grid. With the case studies reviewed above, we can see that using a variety of instruments to develop a specific plan for your company is necessary. This is where recommendations from professionals and referencing resources like the EPA's Guide to Purchasing Green Power can be beneficial in ensuring your company's plans are efficient and cost-effective.

References

1. Sotos, M. (2012, October 8). GHG Protocol Scope 2 Guidance. Greenhouse Gas Protocol |. Retrieved July 28, 2022, from https://ghgprotocol.org/sites/default/files/standards/Scope%20%20Guidance_Final_Sept26.pdf
2. Intergovernmental Panel on Climate Change, & Edenhofer, O. (Eds.). (2014). Climate change 2014: Mitigation of climate change: Working Group III contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.
3. EPA. (2021, September 15). Chapter 7: Planning a Self-Generation Renewable Project. Guide to Purchasing Green Power. Retrieved July 28, 2022, from <https://www.epa.gov/greenpower/guide-purchasing-green-power>
4. EPA. (2022, February 25). Renewable Energy Certificates (RECs) | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs>
5. EPA. (2021, September 15). Ch. 4 Green Power Product Options Guide to Purchasing Green Power | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/greenpower/guide-purchasing-green-power>
6. EPA. (2021, September 15). Develop New Power Purchase Agreement | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/lmop/develop-new-power-purchase-agreement>
7. EPA. (2022, February 25). Physical PPA | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/green-power-markets/physical-ppa>
8. EPA. (2022, February 25). Financial PPA | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/green-power-markets/financial-ppa>
9. EPA. (2022, February 25). Utility Green Tariffs | US EPA. Environmental Protection Agency. Retrieved July 28, 2022, from <https://www.epa.gov/green-power-markets/utility-green-tariffs>
10. AstraZeneca. (2022, April 8). Sustainability Report 2021. AstraZeneca. Retrieved July 28, 2022, from https://www.astrazeneca.com/content/dam/az/Sustainability/2022/pdf/Sustainability_Report_2021.pdf
11. Amazon. (2022, 7 1). Delivering Progress Every Day. Amazon Sustainability. Retrieved August 1, 2022, from <https://sustainability.aboutamazon.com/2021-sustainability-report.pdf>
12. Our third decade of climate action: Realizing a carbon-free future. (2020, September 14). Google. <https://blog.google/outreach-initiatives/sustainability/our-third-decade-climate-action-realizing-carbon-free-future/>
13. Google. (n.d.). Google Environmental Report. Google sustainability. Retrieved July 28, 2022, from <https://www.gstatic.com/gumdrop/sustainability/google-2022-environmental-report.pdf>
14. Tahir, A. (2021, October 25). Dragonscale: a beautiful approach to solar. The Keyword. Retrieved August 1, 2022, from <https://blog.google/outreach-initiatives/sustainability/dragonscale-solar/>